

78-SDP-02-80

BARKER LEMAR
ENGINEERING CONSULTANTS

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2003 Annual Water Quality Report

Carter Lake C&D Landfill

ANQ-L60 Carter Lake, Iowa

MSEK-L61

SAWb-V60 Permit No. 78-SDP-02-80C-CND

Project No. ANDEX 03101

November 24, 2003

1300 Cummins Road, Suite 201, Des Moines, Iowa 50315
(515) 256-8814 Fax (515) 256-0152

BARKER LEMAR
ENGINEERING CONSULTANTS

November 24, 2003

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Ms. Amie Hart
Iowa Department of Natural Resources
Wallace State Office Building
900 East Grand Avenue
Des Moines, IA 50319

RE: **2003 Annual Water Quality Report**
Carter Lake C&D Landfill
Permit No. 78-SDP-02-80C-CND (Closed)
Project No. ANDEX 03101

1300 CUMMINS ROAD

SUITE 201

DES MOINES, IOWA 50315

515.256.8814

515.256.0152 (F)

www.barkerlemar.com

Dear Amie:

BARKER LEMAR ENGINEERING CONSULTANTS (BARKER LEMAR) has completed the water quality monitoring and assessment for the above-referenced site for the year 2003. Our services were performed in general accordance with Iowa Administrative Code (IAC) Section 113.26(4) and the current requirements for implementation of the Hydrologic Monitoring System Plan (HMSP). Please find enclosed a copy of the 2003 Annual Water Quality Report for the above-referenced site.

If you have any questions regarding this report, please contact us at 515/256-8814.

Sincerely,
BARKER LEMAR ENGINEERING CONSULTANTS

Helga C. Mayhew

Helga C. Mayhew
Project Manager

Christine A. Collier

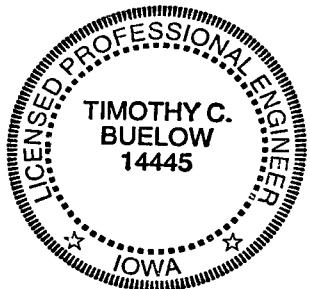
Christine L. Collier, E.I.
Project Manager

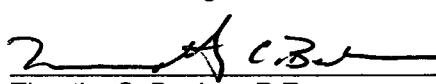
cc: Addressee
Mr. Virgil Anderson, Anderson Excavating
IDNR Field Office #4
File
QA/QC

BARKER LEMAR
ENGINEERING CONSULTANTS

**2003 ANNUAL WATER QUALITY REPORT
CARTER LAKE C&D LANDFILL**
Carter Lake, Iowa
Permit No. 78-SDP-02-80C-CND
November 24, 2003
Project No. ANDEX 03101

I hereby certify that this engineering document was prepared by me or under my direct personal supervision, and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.



 11-26-03
Timothy C. Buelow, P.E. Date

My license renewal date is December 31, 2003.

Pages or sheets covered by this seal: All

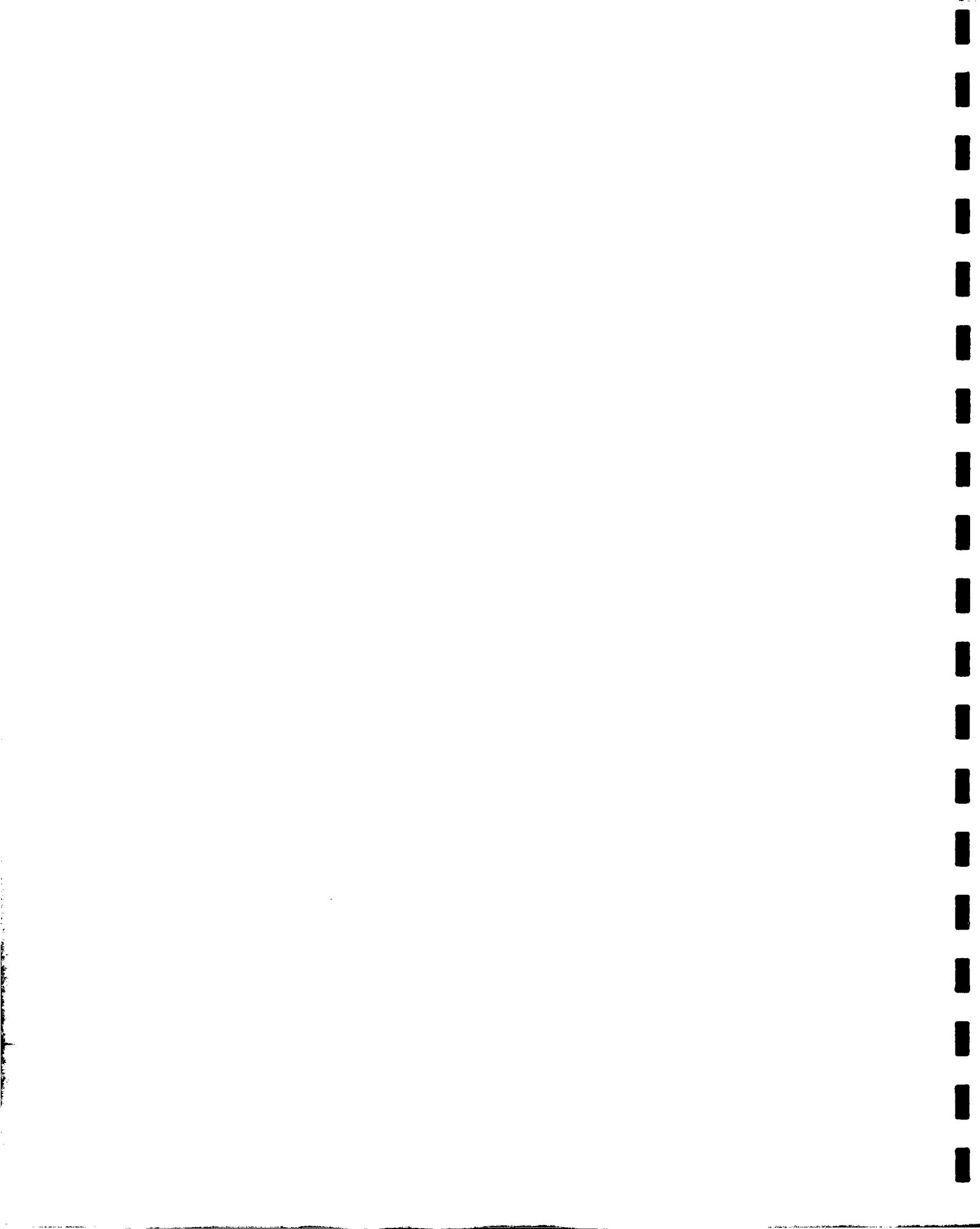


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T15K421

**2003 ANNUAL WATER QUALITY REPORT
CARTER LAKE C&D LANDFILL
Carter Lake, Iowa
Permit No. 78-SDP-02-80C-CND
Project No. ANDEX 03101
November 24, 2003**

1.0 INTRODUCTION

BARKER LEMAR ENGINEERING CONSULTANTS (BARKER LEMAR), on behalf of our client, Anderson Excavating, has completed the required groundwater and surface water sampling at the above-referenced site. Sampling was performed in general accordance with Iowa Administrative Code (IAC) Section 113.26(4) and the provisions identified in the landfill permit. This report addresses water quality data collected during the 2003 sampling event and discusses the following issues:

- Observations made during the collection of samples;
- Results of the physical parameters measured during sample collection;
- The statistical treatment and evaluation of the chemical data;
- Changes or maintenance needed in the monitoring system; and
- Provides a summary listing of analytical data, statistical computation results, graphs of statistical exceptions, and a digital copy of the data.

2.0 FIELD ACTIVITIES AND PROCEDURES

Groundwater monitoring wells were developed and sampled by **BARKER LEMAR** personnel on October 15, 2003. This activity represents the regular annual sampling event for 2003. Water samples from seven (7) groundwater-monitoring wells were collected during this event. The surface point was dry during this event. Sampling forms for the sampling event are included in Appendix A. The general groundwater field measurement and sampling procedures used are outlined on the following page:

- Static water levels and total well depths were measured using an electronic water level indicator.
- Wells were purged of approximately three well volumes or until dry using dedicated Waterra® development/sampling pumps. Groundwater elevations were measured after well development.
- Field measurements of pH, temperature, and specific conductance were collected during development to be used as indicators of well conditions prior to sample collection.
- Groundwater samples were collected by using the Waterra® pumps and/or disposable bailers and by transferring the samples into laboratory-prepared containers. Bailers were used to facilitate collection of groundwater samples in the low-yield monitoring wells and surface point. The samples collected for dissolved metals analysis were filtered using 0.45 micron filters.
- Samples were submitted for laboratory analysis under chain-of-custody procedures. Analysis was performed as indicated in the Hydrologic Monitoring System Plan (HMSP), the Preliminary Groundwater Assessment, dated April 8, 1998, and the IAC 567 Sections 113.26(4)(e) and (f), and the provisions identified in the landfill permit.

3.0 MONITORING SYSTEM

The groundwater monitoring system in-place at the site is comprised of seven monitoring wells (MW-1, MW-3, MW-4, MW-5, MW-6, MW-7R, MW-8) and one surface-water monitoring point (SW-1). Figure 1 shows the location of the monitoring system points.

3.1 GROUNDWATER MONITORING SYSTEM

Two distinct groundwater regimes are monitored by the corresponding monitoring wells, shown in Table 1 as follows.

TABLE 1
MONITORING WELL PLACEMENT

REGIME	MONITORING WELLS
Grouping No. 1 (Aquifer 1)	Upgradient: MW-7R Downgradient: MW-1, MW-3, MW-5,
Grouping No. 2 (Aquifer 2)	Upgradient: MW-4, MW-6 Downgradient: MW-8

The monitoring well designations were revised in the "Preliminary Groundwater Assessment" dated April 8, 1998 submitted by **BARKER LEMAR**.

3.2 SURFACE WATER MONITORING

A surface water monitoring point, SW-1 has been established for the site at the southeast corner of the landfill. It is a drainage ditch that collects the majority of the surface water from the site.

4.0 MONITORING SYSTEM PERFORMANCE EVALUATION

The hydrologic monitoring system was re-evaluated to determine the reliability of the performance of the monitoring well points based on the following tasks.

- The high and low groundwater levels were compared to well depth/screened interval.
- The frequency of non-flowing surface water sampling points was evaluated.
- Water level conditions in the monitoring wells were reviewed to evaluate possible changes in the hydrologic setting/flow paths due to landfilling activities.
- Well depths were measured to evaluate integrity and siltation.
- A visual inspection of well integrity was performed during the sampling event.

4.1 WATER LEVEL MEASUREMENTS

The results of the water level measurements and well depth measurements are shown in Table 2 (Summary of Groundwater Levels and Well Performance) on the following page. The October 2003 data indicate that groundwater levels range from 964.85 feet above mean sea level (ft amsl) in MW-8 to 971.21 ft amsl in MW-7R. When comparing current groundwater levels with levels observed in the previous year the fluctuations ranged from a decrease in MW-5 of 1.13 feet to an increase of 0.37 feet in MW-1, with five wells showing a decrease (MW-3, MW-4, MW-5, MW-6, and MW-8) and two wells showing an increase (MW-1 and MW-7R).

TABLE 2
SUMMARY OF GROUNDWATER LEVELS AND WELL PERFORMANCE
CARTER LAKE C & D LANDFILL
CARTER LAKE, IOWA
PERMIT NO. 78-SDP-02-80C-CND
PROJECT NO. ANDEX 03101

WELL	TOC	TOS	TD	DATUM	DATE OF MEASUREMENT		
					October 4, 2001	October 3, 2002	October 15, 2003
MW-1	985.16	977.0	23.5	GROUNDWATER LEVEL	14.12	15.87	15.50
				GROUNDWATER ELEVATION	971.04	969.29	969.66
				MEASURED WELL DEPTH	20.4	20.0	20.4
MW-3	986.3	978.0	23.5	GROUNDWATER LEVEL	19.18	18.59	19.40
				GROUNDWATER ELEVATION	967.12	967.71	966.90
				MEASURED WELL DEPTH	20.0	19.9	20.0
MW-4	985.66	935.6	58.4	GROUNDWATER LEVEL	18.61	17.98	18.95
				GROUNDWATER ELEVATION	967.05	967.68	966.71
				MEASURED WELL DEPTH	58.4	58.3	58.3
MW-5	985.82	977.9	24.5	GROUNDWATER LEVEL	18.47	17.98	19.11
				GROUNDWATER ELEVATION	967.35	967.84	966.71
				MEASURED WELL DEPTH	24.2	24.2	24.3
MW-6	985.45	938.1	57.4	GROUNDWATER LEVEL	18.48	17.96	18.95
				GROUNDWATER ELEVATION	966.97	967.49	966.50
				MEASURED WELL DEPTH	57.1	57.0	57.1
MW-7R	986.13	978.0	23.1	GROUNDWATER LEVEL	14.59	15.11	14.92
				GROUNDWATER ELEVATION	971.54	971.02	971.21
				MEASURED WELL DEPTH	23.1	23.0	23.1
MW-8	982.05	934.1	56.9	GROUNDWATER LEVEL	16.90	16.28	17.20
				GROUNDWATER ELEVATION	965.15	965.77	964.85
				MEASURED WELL DEPTH	56.4	56.6	56.4

All measurements in feet.

NA - Data are not available.

TOC - Top of casing elevation, reference for water level measurements.

TOS - Top of screen elevation.

TD - Total depth (as originally reported).

The monitoring wells in Group No. 1 were observed to have piezometric levels in the screened interval during the 2003 sampling event. The monitoring wells in Group No. 2, used to measure the potentiometric surface of Aquifer 2, had piezometric levels ranging from approximately 28.5 feet to 31.1 feet above the screened interval. Water levels in the monitoring wells have been sufficient to yield ground water samples during the 2003 sampling event.

4.2 GROUNDWATER FLOW

Groundwater contours were determined for Aquifer 1 and Aquifer 2 using water elevation data collected by BARKER LEMAR personnel on October 15, 2003. The October 15, 2003, groundwater contours for Aquifer 1 and Aquifer 2 are presented in Figures 1 and 2, respectively. The historical groundwater flow directions are summarized in the table on the following page.

Review of the upper aquifer groundwater flow pattern indicates that in October 2003 the general flow direction of this aquifer is in an east/southeasterly direction with a gradient of approximately 0.008 ft/ft. The groundwater flow direction for the potentiometric surface of the lower aquifer has been observed to exhibit a flow direction in a northwesterly direction across the site with a general gradient of 0.03 ft/ft.

4.3 WELL SILTATION

The monitoring well depths measured during the 2003 sampling event were generally within 0.5 foot of the installed depth in five wells. Monitoring well MW-1 was within 3.5 feet of the installed depth and MW-3 was within 3.6 feet of the installed depth (Table 2). Based on the ability of the dedicated purging system to remove accumulated sediment, it appears unlikely that siltation will adversely impact the groundwater monitoring points at this site. However, MW-1 and MW-3 are purged with bailers, therefore accumulated sediment may not be removed. The measured depths of these two wells have been relatively consistent for the past three years indicating no further loss of depth.

TABLE 3
HISTORICAL GROUNDWATER FLOW DIRECTIONS

Date	Upper Aquifer	Lower Aquifer
May 9, 1996	South	East/Southeast
October 2, 1996	East/Southeast	North*
January 27, 1997	Southeast	North*
April 15, 1997	East	North*
July 23, 1997	East	North*
October 15, 1997	East**	North*
April 6, 1998	East**	North*
October 13, 1998	Southeast	North*
April 15, 1999	Northeast	Northwest
October 7, 1999	Southeast	Northwest
October 12, 2000***	Southeast	Northwest
October 4, 2001***	Southeast	Northwest
October 3, 2002***	Southeast	Northwest
October 15, 2003***	Southeast	Northwest

* Indicates a converging flow pattern. The centralized flow direction is indicated.

** Indicates a diverging flow pattern. The centralized flow direction is indicated.

*** As of 2000, the landfill was sampled annually.

4.4 SAMPLING POINT OBSERVATIONS

In general, problems regarding the integrity of the monitoring wells or sampling points were not noted.

4.5 FREQUENCY OF NON-FLOWING SAMPLING POINTS

SW-1 was not flowing during the 2003 sampling event. As this is a drainage ditch for storm water leaving the site, flow will only be present during or shortly after storm events.

5.0 DATA EVALUATION METHODS

The statistical evaluation of the chemical data was completed in accordance with IAC 567 Section 113.26(6).

5.1 WELL GROUPING

The groundwater regimes discussed in Section 3.1 were evaluated separately as was the surface water monitoring point. Upgradient monitoring points have been selected from each group for statistical comparison. The selection of upgradient points has been based on the "Preliminary Groundwater Assessment", submitted by Barker, Lemar and Associates, Inc. in April 1998.

5.2 CONTROL LIMITS

Once the groupings were completed, the mean, standard deviation, and control limits were calculated for each of the chemical parameters in the upgradient monitoring point. The control limit represents the limit at which a statistical exceedance beyond the background concentrations has occurred. For the purpose of this evaluation, control limits are defined as the mean of the concentrations for the upgradient monitoring point plus two times the standard deviation for each parameter. A lower control limit is also used for evaluation of pH levels.

5.3 METHOD DETECTION LIMITS

Many of the parameters were observed at concentrations less than the method detection limits (MDLs). The mean, standard deviation, and control limit are computed by utilizing the reporting limit value in the computations (i.e., <0.05 becomes 0.05). In situations where the upgradient monitoring point concentrations were below the MDLs, the standard deviation and control limits were not calculated. It should be noted that in some cases in which control limits were not calculated for the aforementioned reason, the measured downgradient concentration exceeded the upgradient mean.

5.4 REGULATORY ACTION LIMITS

In addition to evaluating the concentration in comparison to upgradient control limits, the concentrations are also compared to current United States Environmental Protection Agency (USEPA) Maximum Contaminant Levels (MCLs), Negligible Risk Levels (NRLs) and Health Advisory Levels (HALs). IDNR guidance documents define the "action level" for groundwater as the following:

"As defined by 567 - 133.2 (455B, 455E), action level means the HAL, if one exists. If there is no HAL, then the NRL, if one exists. If there is no HAL or NRL, then the MCL. If there is no HAL, NRL, or MCL, an action level may be established by the department based on current technical literature and recommended guidelines of the USEPA and recognized experts, on a case-by-case basis."

The arsenic concentration in monitoring wells MW-3, MW-5, and MW-8 exceeded the NRL of 0.00002 mg/L but were below the MCL of 0.010 mg/L. Monitoring wells MW-4, MW-6, and MW-7R were observed to have arsenic concentrations above both the NRL of 0.00002 mg/L and the MCL of 0.010 mg/L.

6.0 EVALUATION OF WATER QUALITY PARAMETERS

The analytical results of the downgradient monitoring wells and surface water points are presented in Appendix B (Summary of Groundwater Chemistry). The associated analytical data reports for October are included in Appendix C. Parameters were graphed in relation to the current mean and standard deviation for each group. Results that exceeded the current upgradient control limits are presented in the Exceedance Table in Appendix D. The graphs depicting the changes of each parameter in each downgradient monitoring point are included in Appendix E. Note, some graphs depict values that exceed the upper control limit and are not included in the summary of exceedances table. These values are not reported as exceedances due to the upper control limit being less than the detection level of that parameter's test method.

7.0 SUMMARY AND RECOMMENDATIONS

A summary of the exceedances computed for the downgradient monitoring wells is shown in Table 4.

TABLE 4
SUMMARY OF EXCEEDANCES

Parameter	MW-1
Chloride	10

10 = October 2003 Sampling Event

Review of the historical analytical results for arsenic analysis indicates that the measured concentrations decreased during the October 2003 sampling event in monitoring wells MW-1 MW-3, MW-4, MW-5, MW-6, and MW-7R, and remained constant in MW-8. Based upon the flow directions observed during 2003, the arsenic contamination appears to originate off-site.

Based on these results, BARKER LEMAR recommends continued routine annual water sampling for the parameters listed in IAC Chapter 113.2(4)(e) and (f). BARKER LEMAR recommends monitoring wells MW-1, MW-3, MW-4, MW-5, MW-6, MW-7R, and MW-8 continue to be sampled annually for arsenic. Quarterly sampling of SW-1 for "d", "e", and "f" parameters is also recommended until four quarters of data are obtained.

8.0 GENERAL COMMENTS

The analysis and opinions expressed in this report are based upon data obtained from the samples collected at the indicated locations and from any other information discussed in this report. This report does not reflect any variations in subsurface stratigraphy, hydrogeology, or chemical concentrations that may occur between sampling locations or across the site. Actual subsurface conditions may vary and may not become evident without further exploration.

BARKER LEMAR has prepared this report for the exclusive use of our client for the specific application to the project discussed. No warranty is expressly stated or implied in this report with regard to the condition of substrate and groundwater below the surface of the facility. **BARKER LEMAR** has relied upon information furnished by others as noted in the report, and **BARKER LEMAR** accepts no responsibility for any deficiency, misstatements, or inaccuracy in this report as a result of misstatements, omissions, misrepresentations, fraudulent, or inaccurate information or data provided by others.

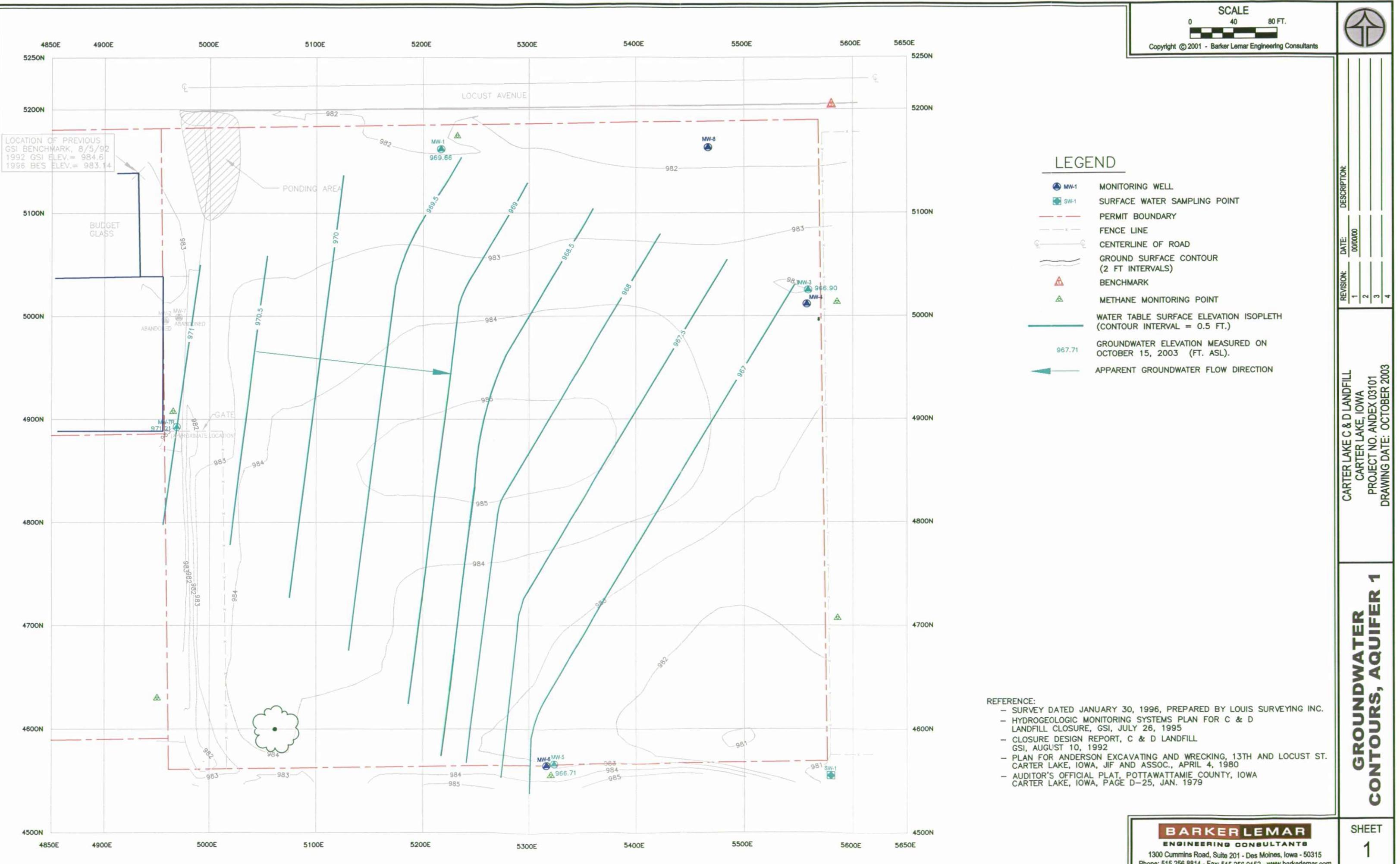
9.0 REFERENCES

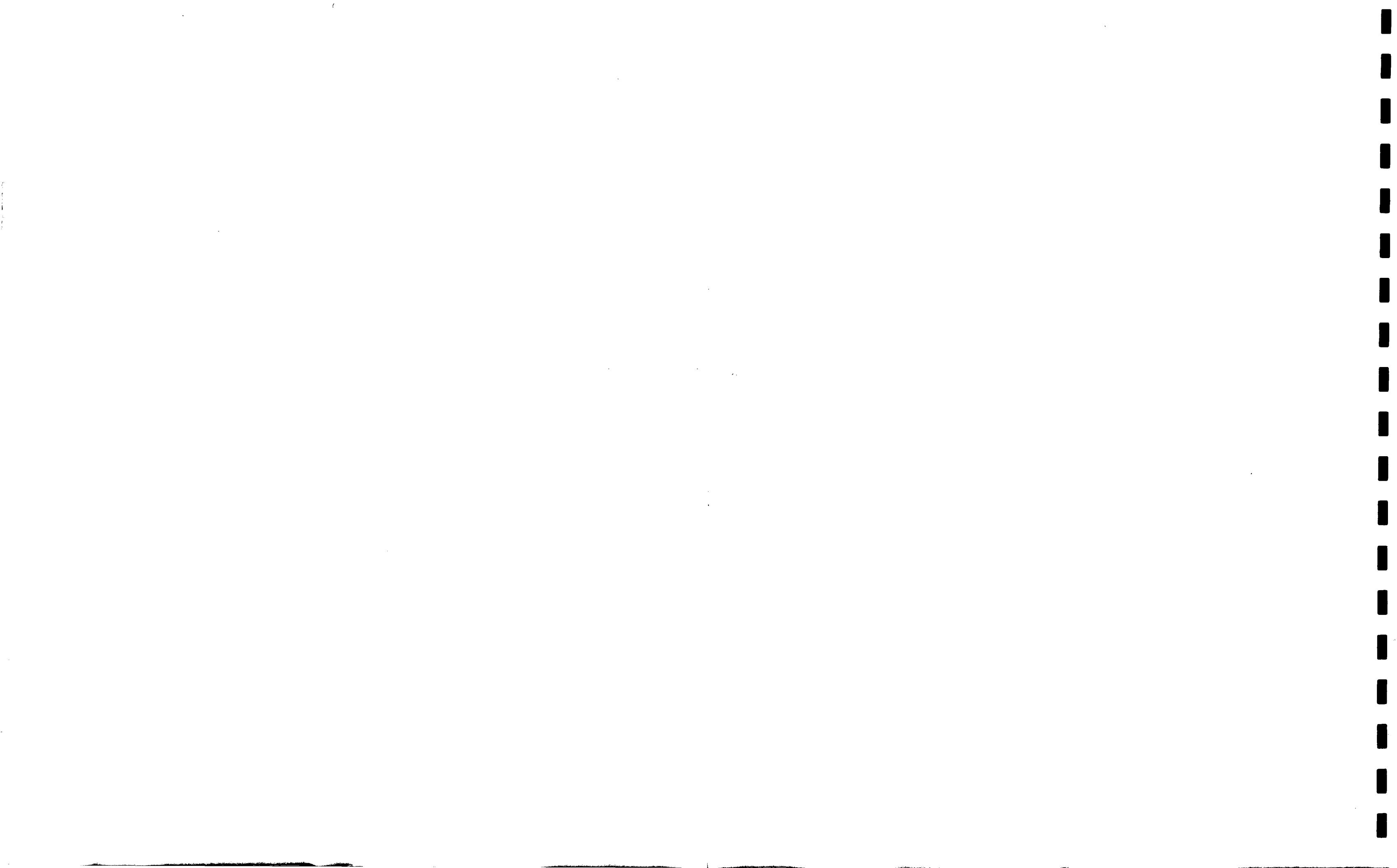
1. Iowa Department of Natural Resources. *Annual Report 1997, Registry of Hazardous Waste or Hazardous Substance Disposal Sites and Hazardous Waste Remedial Fund.* Dated January 1, 1998.
2. Barker Environmental Services, Inc. *Revised Hydrologic Monitoring System Plan, C&D Landfill Carter Lake, Iowa.* August 29, 1996.
3. Barker Environmental Services, Inc. *1997 Annual Water Quality Report, Carter Lake C&D Landfill (CLOSED).* December 29, 1997.
4. Barker, Lemar & Associates, Inc. *Preliminary Groundwater Assessment, Carter Lake C&D Landfill (CLOSED).* April 8, 1998.
5. Barker, Lemar and Associates, Inc. *1998 Annual Water Quality Report, Carter Lake C&D Landfill (CLOSED).* November 16, 1998.
6. Barker, Lemar and Associates, Inc. *1999 Annual Water Quality Report, Carter Lake C&D Landfill (CLOSED).* November 29, 1999.
7. Barker, Lemar and Associates, Inc. *2000 Annual Water Quality Report, Carter Lake C&D Landfill (CLOSED).* November 21, 2000.
8. **BARKER LEMAR ENGINEERING CONSULTANTS.** *2001 Annual Water Quality Report, Carter Lake C&D Landfill (CLOSED).* November 26, 2001.
9. **BARKER LEMAR ENGINEERING CONSULTANTS.** *2002 Annual Water Quality Report, Carter Lake C&D Landfill (CLOSED).* November 28, 2002.

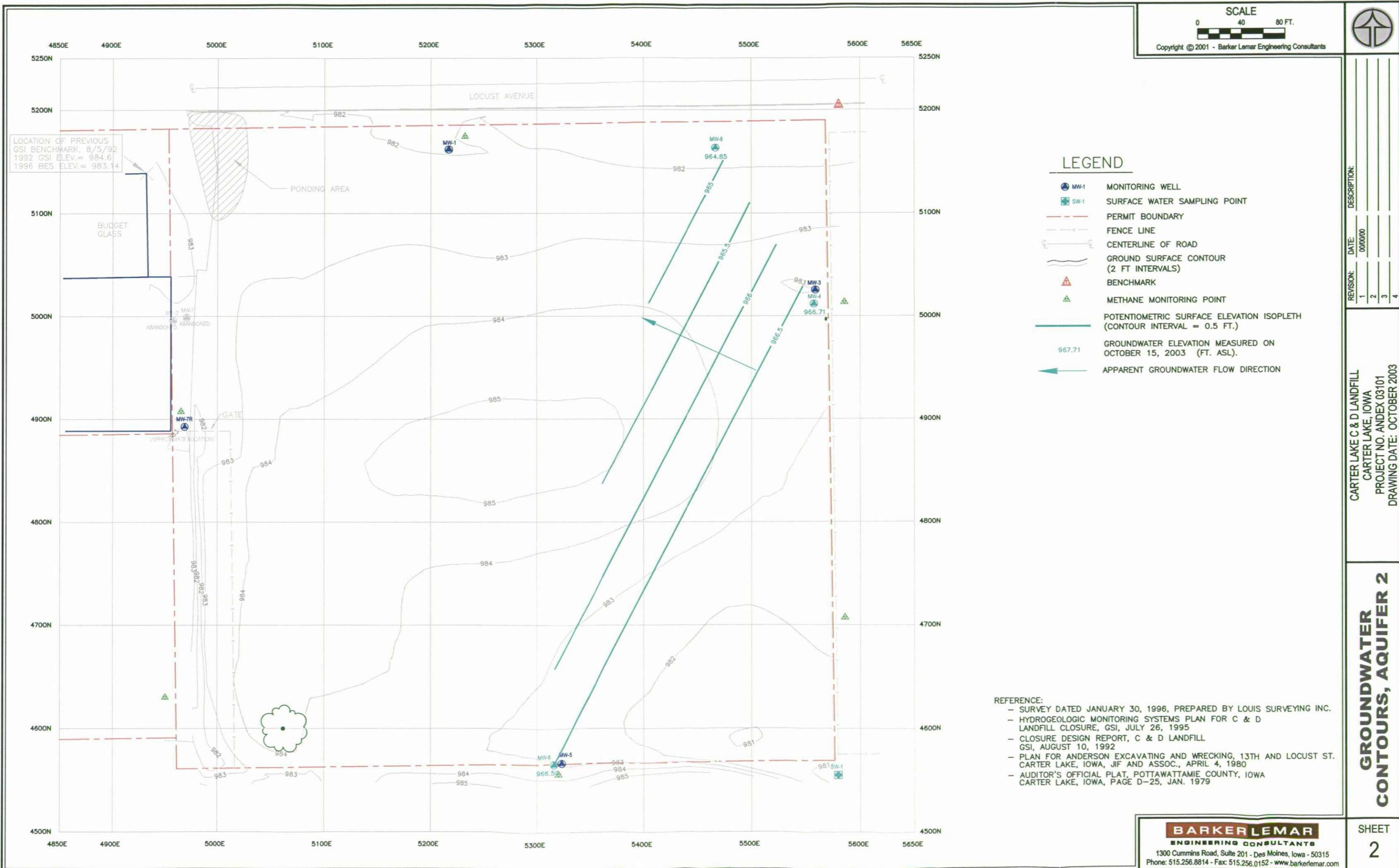
FIGURES
GROUNDWATER CONTOUR MAPS

SCALE
0 40 80 FT.

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REFERENCE:

- SURVEY DATED JANUARY 30, 1996, PREPARED BY LOUIS SURVEYING INC.
- HYDROGEOLOGIC MONITORING SYSTEMS PLAN FOR C & D LANDFILL CLOSURE, GSI, JULY 26, 1995
- CLOSURE DESIGN REPORT, C & D LANDFILL GSI, AUGUST 10, 1992
- PLAN FOR ANDERSON EXCAVATING AND WRECKING, 13TH AND LOCUST ST. CARTER LAKE, IOWA, JIF AND ASSOC., APRIL 4, 1980
- AUDITOR'S OFFICIAL PLAT, POTAWATTAMIE COUNTY, IOWA CARTER LAKE, IOWA, PAGE D-25, JAN. 1979

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SHEET
2

APPENDIX A
SAMPLING FORMS

LANDFILL GROUNDWATER SAMPLING DATA SHEET

Project Information

Project Name: Anderson Excavating
 Project Location: Carter Lake, Iowa
 Project Number: ANDEX 03101
 SLF Permit No. 78-SDP-2-80C-CND
 Weather Conditions: Cloudy, 60 degree F, 0-5 mph wind

Sampling Information

Date Sampled: 10/15/2003
 Sampling Crew: Mike Martin
 Equipment: Water Level Heron
 pH/Conductivity Hanna

Well No.	Date	Well Purging Information													Comments, Time Sampled:
		Static Water Level (ft.)	Measured Well Depth (ft.)	Time at Start of Purging	Volume Purged (gals)	Water Depth After Purging (ft.)	Water Depth Before Sampling (ft.)	Purging Equipment (See Note 1)	Stabilized pH (S.U.)	Stabilized Conductivity (uS/cm)	Stabilized Temperature (C)	Well Properly Capped (Y/N)	Litter or Standing Water (Y/N)		
MW-1	10/15/2003	15.50	20.4	10:35 AM	1	Dry	17.34	B	6.18	1259	13.1	Y	N		10:45 AM
MW-3	10/15/2003	19.40	20.0	NA	0	19.40	19.40	B	6.78	740	13.3	Y	N	10:00:00 AM Not purged prior to sample due to insufficient water column.	
MW-4	10/15/2003	18.95	58.3	9:15 AM	20	18.95	18.95	W	6.39	981	13.0	Y	N		9:45 AM
MW-5	10/15/2003	19.11	24.3	8:20 AM	1	Dry	21.90	W	6.48	814	13.2	Y	Litter		8:35 AM
MW-6	10/15/2003	18.95	57.1	8:40 AM	18	18.95	18.95	W	6.69	776	12.7	Y	Litter		9:10 AM
MW-7R	10/15/2003	14.92	23.1	8:00 AM	2	Dry	20.75	B	6.30	785	14.7	Y	N		11:10 AM
MW-8	10/15/2003	17.20	56.4	10:05 AM	17	17.20	17.20	W	6.29	1166	12.4	Y	N		10:30 AM
Surface Water Point No.	Date	Width	Depth	Flowrate Point	Water Flowing (Y/N)	Ground Discolored (Y/N)	Litter (Y/N)	Stabilized pH (S.U.)	Stabilized Conductivity (uS/cm)	Stabilized Temperature (C)	Water Odor (Y/N)	Water Discoloration (Y/N)	Comments, Time Sampled:		
SW-1	10/15/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Dry	

Note 1: VALID TYPES - Bailer (B), Submersible (S), Waterra (W), Vacuum Pump (V), Dedicated Bailer (DB), Other (describe in comments)

FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT

Site Name	<u>Anderson Excavating</u>	Permit No.	<u>78-SDP-2-80C-CND</u>
MW/Piezometer No.	<u>MW-1</u>	Upgradient	<u></u>
		Downgradient	<u>X</u>
Name of Person Sampling	<u>Mike Martin</u>		

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	<u>Yes</u>	Standing Water/Litter?	<u>No</u>
If NO, Explain	<u></u>		

B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Top of Casing Elevation	<u>985.16</u>	feet	Ground Elevation (ft.)	<u>981.95</u>
Drilled Well Depth (ft.)	<u>23.5</u>	feet	Casing Dia. (in.)	<u>2.0</u>
Measured Well Depth (ft.)	<u>20.4</u>	feet		

Equipment Used	<u>Heron</u>		
----------------	--------------	--	--

Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purging	<u>10/15/2003</u>	<u>10:35 AM</u>	<u>15.50</u>	<u>969.66</u>
After Purging	<u>10/15/2003</u>	<u>10:35 AM</u>	<u>Dry</u>	<u>Dry</u>
Before Sampling	<u>10/15/2003</u>	<u>10:35 AM</u>	<u>17.34</u>	<u>967.82</u>

C. WELL PURGING*

Quantity of Water Removed from Well (gallons)	<u>1</u>
No. of Well Volumes (based on current water level)	<u>1.3</u>
Was well pumped/bailed dry?	<u>Yes</u>

Equipment Used:

Bailer Type	<u>Bailer</u>	Dedicated Bailer?	<u>No</u>
Pump Type	<u>Not Used</u>	Dedicated Pump?	<u>No</u>

If not dedicated, method of cleaning	<u>disposable bailer</u>
--------------------------------------	--------------------------

D. FIELD MEASUREMENTS*

Weather Conditions	<u>Cloudy, 60 degree F, 0-5 mph wind</u>		
--------------------	--	--	--

Field Measurements (after stabilization):

Temperature	<u>13.1</u>	Units	<u>Celsius</u>
Equipment Used	<u>Hanna</u>		
pH	<u>6.18</u>	Units	<u>Standard Units</u>
Equipment Used	<u>Hanna</u>		
Spec. Conductance	<u>1259</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Hanna</u>		

COMMENTS

IDNR Form 542-1322

*Omit if only measuring groundwater elevations.

FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT

Site Name	<u>Anderson Excavating</u>	Permit No.	<u>78-SDP-2-80C-CND</u>
MW/Piezometer No.	<u>MW-3</u>	Upgradient	<u></u>
		Downgradient	<u>X</u>
Name of Person Sampling	<u>Mike Martin</u>		

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	<u>Yes</u>	Standing Water/Litter?	<u>No</u>
If NO, Explain	<u></u>		

B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Top of Casing Elevation	<u>986.30</u>	feet	Ground Elevation (ft.)	<u>983.00</u>
Drilled Well Depth (ft.)	<u>23.5</u>	feet	Casing Dia. (in.)	<u>2.0</u>
Measured Well Depth (ft.)	<u>20.0</u>	feet		

Equipment Used	<u>Heron</u>		
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Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purgung	<u>10/15/2003</u>	<u>NA</u>	<u>19.40</u>	<u>966.90</u>
After Purgung	<u></u>	<u></u>	<u>NA</u>	<u>NA</u>
Before Sampling	<u></u>	<u></u>	<u>19.40</u>	<u>966.90</u>

C. WELL PURGING*

Quantity of Water Removed from Well (gallons)	<u>0</u>
No. of Well Volumes (based on current water level)	<u>0.0</u>
Was well pumped/bailed dry?	<u>No</u>

Equipment Used:			
Bailer Type	<u>Bailer</u>	Dedicated Bailer?	<u>No</u>
Pump Type	<u>Not Used</u>	Dedicated Pump?	<u>No</u>
If not dedicated, method of cleaning	<u>disposable bailer</u>		

D. FIELD MEASUREMENTS*

Weather Conditions	<u>Cloudy, 60 degree F, 0-5 mph wind</u>		
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Field Measurements (after stabilization):

Temperature	<u>13.3</u>	Units	<u>Celsius</u>
Equipment Used	<u>Hanna</u>		
pH	<u>6.78</u>	Units	<u>Standard Units</u>
Equipment Used	<u>Hanna</u>		
Spec. Conductance	<u>740</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Hanna</u>		

COMMENTS	<u>Not purged prior to sample due to insufficient water column.</u>		
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IDNR Form 542-1322

*Omit if only measuring groundwater elevations.

FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT

Site Name	<u>Anderson Excavating</u>	Permit No.	<u>78-SDP-2-80C-CND</u>
MW/Piezometer No.	<u>MW-4</u>	Upgradient	<u>X</u>
		Downgradient	

Name of Person Sampling	<u>Mike Martin</u>
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A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	<u>Yes</u>	Standing Water/Litter?	<u>No</u>
If NO, Explain	<hr/>		

B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Top of Casing Elevation	<u>985.66</u>	feet	Ground Elevation (ft.)	<u>983.57</u>
Drilled Well Depth (ft.)	<u>58.4</u>	feet	Casing Dia. (in.)	<u>2.0</u>
Measured Well Depth (ft.)	<u>58.3</u>	feet		

Equipment Used	<u>Heron</u>
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Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purgung	<u>10/15/2003</u>	<u>9:15 AM</u>	<u>18.95</u>	<u>966.71</u>
After Purgung	<u>10/15/2003</u>	<u>9:15 AM</u>	<u>18.95</u>	<u>966.71</u>
Before Sampling	<u>10/15/2003</u>	<u>9:15 AM</u>	<u>18.95</u>	<u>966.71</u>

C. WELL PURGING*

Quantity of Water Removed from Well (gallons)	<u>20</u>
No. of Well Volumes (based on current water level)	<u>3.1</u>
Was well pumped/bailed dry?	<u>No</u>

Equipment Used:			
Bailer Type	<u>Not Used</u>	Dedicated Bailer?	<u>No</u>
Pump Type	<u>Waterra</u>	Dedicated Pump?	<u>Yes</u>

If not dedicated, method of cleaning _____

D. FIELD MEASUREMENTS*

Weather Conditions	<u>Cloudy, 60 degree F, 0-5 mph wind</u>
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Field Measurements (after stabilization):

Temperature	<u>13.0</u>	Units	<u>Celsius</u>
Equipment Used	<u>Hanna</u>		
pH	<u>6.39</u>	Units	<u>Standard Units</u>
Equipment Used	<u>Hanna</u>		
Spec. Conductance	<u>981</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Hanna</u>		

COMMENTS

IDNR Form 542-1322

*Omit if only measuring groundwater elevations.

FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT

Site Name	<u>Anderson Excavating</u>	Permit No.	<u>78-SDP-2-80C-CND</u>
MW/Piezometer No.	<u>MW-5</u>	Upgradient	<u></u>
		Downdrain	<u>X</u>
Name of Person Sampling	<u>Mike Martin</u>		

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	<u>Yes</u>	Standing Water/Litter?	<u>Yes</u>
If NO, Explain	<u></u>	If YES, Explain	<u>litter</u>

B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Top of Casing Elevation	<u>985.82</u>	feet	Ground Elevation (ft.)	<u>982.85</u>
Drilled Well Depth (ft.)	<u>24.5</u>	feet	Casing Dia. (in.)	<u>2.0</u>
Measured Well Depth (ft.)	<u>24.3</u>	feet		

Equipment Used	<u>Heron</u>
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Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purging	<u>10/15/2003</u>	<u>8:20 AM</u>	<u>19.11</u>	<u>966.71</u>
After Purging	<u></u>	<u></u>	<u>Dry</u>	<u>Dry</u>
Before Sampling	<u></u>	<u></u>	<u>21.90</u>	<u>963.92</u>

C. WELL PURGING*

Quantity of Water Removed from Well (gallons)	<u>1</u>
No. of Well Volumes (based on current water level)	<u>1.2</u>
Was well pumped/bailed dry?	<u>Yes</u>

Equipment Used:

Bailer Type	<u>Not Used</u>	Dedicated Bailer?	<u>No</u>
Pump Type	<u>Waterra</u>	Dedicated Pump?	<u>Yes</u>

If not dedicated, method of cleaning _____

D. FIELD MEASUREMENTS*

Weather Conditions	<u>Cloudy, 60 degree F, 0-5 mph wind</u>
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Field Measurements (after stabilization):

Temperature	<u>13.2</u>	Units	<u>Celsius</u>
Equipment Used	<u>Hanna</u>		
pH	<u>6.48</u>	Units	<u>Standard Units</u>
Equipment Used	<u>Hanna</u>		
Spec. Conductance	<u>814</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Hanna</u>		

COMMENTS _____

IDNR Form 542-1322

*Omit if only measuring groundwater elevations.

FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT

Site Name	<u>Anderson Excavating</u>	Permit No.	<u>78-SDP-2-80C-CND</u>
MW/Piezometer No.	<u>MW-6</u>	Upgradient	<u>X</u>
		Downgradient	

Name of Person Sampling	<u>Mike Martin</u>
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A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	<u>Yes</u>	Standing Water/Litter?	<u>Yes</u>
If NO, Explain	<u> </u>	If YES, Explain	<u>litter</u>

B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Top of Casing Elevation	<u>985.45</u>	feet	Ground Elevation (ft.)	<u>983.08</u>
Drilled Well Depth (ft.)	<u>57.4</u>	feet	Casing Dia. (in.)	<u>2.0</u>
Measured Well Depth (ft.)	<u>57.1</u>	feet		

Equipment Used	<u>Heron</u>
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Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purging	<u>10/15/2003</u>	<u>8:40 AM</u>	<u>18.95</u>	<u>966.50</u>
After Purging	<u> </u>	<u> </u>	<u>18.95</u>	<u>966.50</u>
Before Sampling	<u> </u>	<u> </u>	<u>18.95</u>	<u>966.50</u>

C. WELL PURGING*

Quantity of Water Removed from Well (gallons)	<u>18</u>
No. of Well Volumes (based on current water level)	<u>2.9</u>
Was well pumped/bailed dry?	<u>No</u>

Equipment Used:			
Bailer Type	<u>Not Used</u>	Dedicated Bailer?	<u>No</u>
Pump Type	<u>Waterra</u>	Dedicated Pump?	<u>Yes</u>

If not dedicated, method of cleaning _____

D. FIELD MEASUREMENTS*

Weather Conditions	<u>Cloudy, 60 degree F, 0-5 mph wind</u>
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Field Measurements (after stabilization):

Temperature	<u>12.7</u>	Units	<u>Celsius</u>
Equipment Used	<u>Hanna</u>		
pH	<u>6.69</u>	Units	<u>Standard Units</u>
Equipment Used	<u>Hanna</u>		
Spec.Conductance	<u>776</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Hanna</u>		

COMMENTS _____

IDNR Form 542-1322

*Omit if only measuring groundwater elevations.

FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT

Site Name	<u>Anderson Excavating</u>	Permit No.	<u>78-SDP-2-80C-CND</u>
MW/Piezometer No.	<u>MW-7R</u>	Upgradient	<u>X</u>
		Downgradient	
Name of Person Sampling	<u>Mike Martin</u>		

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	<u>Yes</u>	Standing Water/Litter?	<u>No</u>
If NO, Explain	<u> </u>		

B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Top of Casing Elevation	<u>986.13</u>	feet	Ground Elevation (ft.)	<u>983.22</u>
Drilled Well Depth (ft.)	<u>23.1</u>	feet	Casing Dia. (in.)	<u>2.0</u>
Measured Well Depth (ft.)	<u>23.1</u>	feet		

Equipment Used	<u>Heron</u>		
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Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purgung	<u>10/15/2003</u>	<u>8:00 AM</u>	<u>14.92</u>	<u>971.21</u>
After Purgung	<u> </u>	<u> </u>	<u>Dry</u>	<u>Dry</u>
Before Sampling	<u> </u>	<u> </u>	<u>20.75</u>	<u>965.38</u>

C. WELL PURGING*

Quantity of Water Removed from Well (gallons)	<u>2</u>
No. of Well Volumes (based on current water level)	<u>1.5</u>
Was well pumped/bailed dry?	<u>Yes</u>

Equipment Used:

Bailer Type	<u>Bailer</u>	Dedicated Bailer?	<u>No</u>
Pump Type	<u>Not Used</u>	Dedicated Pump?	<u>No</u>

If not dedicated, method of cleaning	<u>disposable bailer</u>
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D. FIELD MEASUREMENTS*

Weather Conditions	<u>Cloudy, 60 degree F, 0-5 mph wind</u>		
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Field Measurements (after stabilization):

Temperature	<u>14.7</u>	Units	<u>Celsius</u>
Equipment Used	<u>Hanna</u>		
pH	<u>6.30</u>	Units	<u>Standard Units</u>
Equipment Used	<u>Hanna</u>		
Spec.Conductance	<u>785</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Hanna</u>		

COMMENTS

IDNR Form 542-1322

*Omit if only measuring groundwater elevations.

FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT

Site Name	<u>Anderson Excavating</u>	Permit No.	<u>78-SDP-2-80C-CND</u>
MW/Piezometer No.	<u>MW-8</u>	Upgradient	<u>X</u>
		Downgradient	
Name of Person Sampling	<u>Mike Martin</u>		

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	<u>Yes</u>	Standing Water/Litter?	<u>No</u>
If NO, Explain			

B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Top of Casing Elevation	<u>982.05</u>	feet	Ground Elevation (ft.)	<u>979.05</u>
Drilled Well Depth (ft.)	<u>56.9</u>	feet	Casing Dia. (in.)	<u>2.0</u>
Measured Well Depth (ft.)	<u>56.4</u>	feet		

Equipment Used	<u>Heron</u>			
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Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purging	<u>10/15/2003</u>	<u>10:05 AM</u>	<u>17.20</u>	<u>964.85</u>
After Purging			<u>17.20</u>	<u>964.85</u>
Before Sampling			<u>17.20</u>	<u>964.85</u>

C. WELL PURGING*

Quantity of Water Removed from Well (gallons)	<u>17</u>
No. of Well Volumes (based on current water level)	<u>2.7</u>
Was well pumped/bailed dry?	<u>No</u>

Equipment Used:

Bailer Type	<u>Not Used</u>	Dedicated Bailer?	<u>No</u>
Pump Type	<u>Waterra</u>	Dedicated Pump?	<u>Yes</u>

If not dedicated, method of cleaning _____

D. FIELD MEASUREMENTS*

Weather Conditions	<u>Cloudy, 60 degree F, 0-5 mph wind</u>		
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Field Measurements (after stabilization):

Temperature	<u>12.4</u>	Units	<u>Celsius</u>
Equipment Used	<u>Hanna</u>		
pH	<u>6.29</u>	Units	<u>Standard Units</u>
Equipment Used	<u>Hanna</u>		
Spec. Conductance	<u>1166</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Hanna</u>		

COMMENTS

IDNR Form 542-1322

*Omit if only measuring groundwater elevations.

FORM FOR SURFACE WATER SAMPLING

Site Name	<u>Anderson Excavating</u>	Permit No.	<u>78-SDP-2-80C-CND</u>
Surface Monitoring Point No.	<u>SW-1</u>	Date	<u>October 15, 2003</u>
Name of Person Sampling		<u>Mike Martin</u>	

A. TYPE OF MOINITORING POINT

Stream	<u> </u>	Open Tile	<u> </u>
Road Ditch	<u> </u>	Tile with Riser	<u> </u>
Drainage Ditch	<u>X</u>	Other	<u> </u>

B. PURPOSE OF MONITORING POINT

Upstream	<u> </u> feet	Downstream	<u>X</u>
Within Landfill	<u> </u> feet	Other	<u> </u>

C. MONITORING POINT CONDITIONS

General description/condition of monitoring point

Surface water drainage ditch along south portion of the site.

Was monitoring point dry?	<u>Yes</u>	Too little water to sample?	<u>Yes</u>
Was water flowing?	<u>No</u>	If yes, estimate quantity	<u>NA</u>
		If yes, estimate depth	<u>NA</u>

Was water discolored?	<u>NA</u>
Does water have odor?	<u>NA</u>
Was ground discolored?	<u>No</u>
Litter present?	<u>No</u>

Comments

D. FIELD MEASUREMENTS*

Weather Conditions Cloudy, 60 degree F, 0-5 mph wind

Field Measurements (after stabilization):

Temperature	<u>NA</u>	Units	<u>Celsius</u>
Equipment Used	<u>Hanna</u>		
pH	<u>NA</u>	Units	<u>Standard units</u>
Equipment Used	<u>Hanna</u>		
Spec.Conductance	<u>NA</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Hanna</u>		

COMMENTS

IDNR Form 542-1324

*Omit if only measuring groundwater elevations.

APPENDIX B
SUMMARY OF GROUNDWATER CHEMISTRY

Summary of Groundwater Chemistry

Carter Lake Construction and Demolition Landfill - 78-SDP-02-80-CND

Parameter	Date	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-7R	MW-8
		DN1	UP2	DN1	UP2	DN1	UP2	UP1	UP1	DN2
Chemical Oxygen Demand - mg/L	10/2/1996	70.0	19.0	45.0	29.0	48.0	130	120	NM	46.0
	1/27/1997	62.0	15.0	54.0	33.0	76.0	150	120	NM	46.0
	4/15/1997	94.0	8.70	60.0	40.0	55.0	110	NM	NM	33.0
	7/23/1997	58.0	6.80	85.0	18.0	47.0	NM	110	NM	63.0
	10/15/1997	64.0	57.0	45.0	15.0	31.0	110	120	NM	55.0
	4/6/1998	110	44.0	48.0	17.0	62.0	52.0	77.0	NM	110
	10/13/1998	91.0	50.0	150	27.0	92.0	66.0	NM	NM	NM
	4/15/1999	89.0	NM	66.0	21.0	42.0	51.0	NM	NM	98.0
	10/7/1999	80.0	NM	49.0	22.0	69.0	89.0	NM	NM	110
	10/12/2000	56.0	NM	30.0	19.0	76.0	50.0	NM	NM	54.0
	10/4/2001	41.0	NM	NM	39.0	109	67.0	NM	85	40.0
	10/3/2002	51.0	NM	28.0	31.0	86.0	144	NM	100	28.0
	10/15/2003	120	NM	36.0	24.0	96.0	180	NM	100	30.0
Chloride - mg/L	10/2/1996	160	31.0	160	69.0	64.0	180	94.0	NM	86.0
	1/27/1997	150	36.0	140	65.0	85.0	140	63.0	NM	83.0
	4/15/1997	120	34.0	150	70.0	62.0	150	64.0	NM	84.0
	7/23/1997	140	36.0	120	61.0	60.0	150	110	NM	130
	10/15/1997	130	88.0	880	57.0	54.0	120	86.0	NM	76.0
	4/6/1998	110	70.0	78.0	62.0	50.0	75.0	89.0	NM	210
	10/13/1998	110	84.0	NM	70.0	92.0	96.0	160	NM	160
	4/15/1999	48.0	NM	64.0	70.0	16.0	81.0	NM	NM	160
	10/7/1999	160	NM	130	70.0	99.0	140	NM	NM	160
	10/12/2000	244	NM	120	62.0	NM	NM	NM	NM	112
	10/4/2001	221	NM	NM	98.0	72.0	118	NM	57.0	112
	10/3/2002	215	NM	97.0	61.0	75.0	166	NM	50.0	63.0
	10/15/2003	243	NM	141	46.9	75.3	219	NM	56.3	74.1
Iron, Dissolved - mg/L	10/2/1996	21.0	14.0	18.0	30.0	46.0	36.0	5.50	NM	30.0
	1/27/1997	22.0	14.0	21.0	32.0	75.0	34.0	6.90	NM	27.0
	4/15/1997	34.0	26.0	24.0	36.0	52.0	32.0	8.20	NM	30.0
	7/23/1997	21.0	13.0	62.0	27.0	53.0	30.0	11.0	NM	41.0
	10/15/1997	27.0	40.0	36.0	29.0	42.0	36.0	17.0	NM	42.0
	4/6/1998	44.0	27.0	25.0	29.0	24.0	27.0	28.0	NM	49.0
	10/13/1998	19.0	18.0	29.0	28.0	50.0	25.0	22.0	NM	50.0
	4/15/1999	11.0	NM	8.00	28.0	<0.100	22.0	NM	NM	43.0
	10/7/1999	30.0	NM	28.0	33.0	20.0	29.0	NM	NM	50.0
	10/12/2000	24.5	NM	2.69	27.6	20.5	20.8	NM	NM	35.5
	10/4/2001	21.4	NM	NM	25.1	33.8	23.4	NM	15.3	27.6
	10/3/2002	15.8	NM	1.02	25.7	20.7	34.3	NM	10.3	36.3
	10/15/2003	1.76	NM	<0.100	21.6	3.12	0.130	NM	11.3	<0.100
Nitrogen, Ammonia - mg/L HAL - 30 mg/L	10/2/1996	0.580	1.20	0.350	2.70	1.20	3.00	2.00	NM	2.70
	1/27/1997	0.540	1.00	<0.200	2.30	0.660	3.40	1.20	NM	1.90
	4/15/1997	1.70	1.30	0.580	2.40	0.830	3.60	1.90	NM	2.40
	7/23/1997	1.10	1.30	2.00	2.50	0.540	3.20	2.00	NM	2.40
	10/15/1997	1.30	2.10	0.670	2.40	0.640	2.60	1.60	NM	2.30
	4/6/1998	3.00	3.90	0.980	3.00	0.400	3.40	2.00	NM	1.90
	10/13/1998	1.60	2.90	1.10	2.90	0.630	3.30	3.20	NM	2.50
	4/15/1999	1.50	NM	0.220	3.10	<0.200	3.40	NM	NM	2.70
	10/7/1999	3.60	NM	0.790	3.20	0.730	3.00	NM	NM	2.70
	10/12/2000	<1.00	NM	<1.00	2.40	<1.00	3.00	NM	NM	2.20
	10/4/2001	2.40	NM	NM	2.50	<1.00	3.80	NM	5.30	2.10
	10/3/2002	1.90	NM	<1.00	<1.00	<1.00	3.80	NM	6.10	2.50
	10/15/2003	1.23	NM	<0.200	2.05	0.500	4.23	NM	1.98	1.98
pH - S.U.	10/2/1996	7.10	7.37	7.03	7.24	7.75	7.80	8.10	NM	7.20
	1/27/1997	6.87	7.38	7.10	6.98	6.84	6.86	7.48	NM	6.73
	4/15/1997	7.46	7.49	7.75	7.17	7.34	7.20	7.32	NM	7.55
	7/23/1997	6.55	6.99	7.62	6.95	7.07	6.98	7.12	NM	7.38
	10/15/1997	7.07	7.15	6.94	6.83	7.27	7.05	6.99	NM	7.01
	4/6/1998	7.27	7.38	7.05	6.97	7.44	6.92	7.08	NM	7.13
	10/13/1998	7.11	7.20	7.04	6.80	7.33	6.89	7.12	NM	7.30
	4/15/1999	6.23	NM	6.84	6.56	6.71	6.23	NM	NM	6.12
	10/7/1999	5.51	NM	5.72	5.73	6.26	5.74	NM	NM	5.16
	10/12/2000	5.45	NM	5.79	5.37	5.82	5.67	NM	NM	5.53
	10/4/2001	5.67	NM	NM	7.02	5.65	6.73	NM	5.21	6.85
	10/3/2002	6.71	NM	6.89	6.93	6.68	6.94	NM	6.99	6.91
	10/15/2003	6.18	NM	6.78	6.39	6.48	6.69	NM	6.30	6.29
Specific Conductance - umhos/cm	1/27/1997	1,670	1,410	1,380	1,930	2,950	2,130	2,480	NM	2,190
	4/15/1997	3,600	2,220	3,340	3,230	3,170	2,350	3,100	NM	2,820
	7/23/1997	1,990	2,820	3,090	3,180	2,820	2,730	2,640	NM	2,900
	10/15/1997	2,760	3,440	3,220	2,320	2,020	2,200	3,110	NM	2,760
	4/6/1998	2,630	3,060	3,090	2,420	1,880	1,950	3,240	NM	2,520
	10/13/1998	1,710	3,500	3,360	2,480	1,960	2,020	3,240	NM	2,610
	4/15/1999	2,350	NM	2,940	2,500	1,540	1,940	NM	NM	3,030
	10/7/1999	1,350	NM	1,900	1,240	1,460	960	NM	NM	1,750
	10/12/2000	2,090	NM	2,680	2,190	2,480	1,520	NM	NM	2,030
	10/4/2001	1,520	NM	NM	1,290	1,480	1,080	NM	1,280	1,280
	10/3/2002	1,625	NM	1,578	1,458	1,941	1,787	NM	1,760	1,547
	10/15/2003	1,259	NM	740	981	814	776	NM	785	1,166

Summary of Groundwater Chemistry

Carter Lake Construction and Demolition Landfill - 78-SDP-02-80-CND

Parameter	Date	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-7R	MW-8
		DN1	UP2	DN1	UP2	DN1	UP2	UP1	UP1	DN2
Arsenic, Dissolved - mg/L MCL - 0.010 mg/L NRL - 0.00002 mg/L	10/2/1996	0.022	<0.001	0.029	0.038	0.051	0.119	0.003	NM	0.019
	1/27/1997	0.022	<0.001	0.022	0.031	0.089	0.066	<0.001	NM	0.008
	4/15/1997	0.020	0.024	0.027	0.043	0.060	0.075	0.004	NM	0.013
	7/23/1997	0.028	<0.001	0.039	0.034	0.041	0.075	0.001	NM	0.017
	10/15/1997	0.033	0.012	0.035	0.027	0.041	0.068	0.004	NM	0.014
	4/6/1998	NM	NM	0.003	NM	0.008	0.035	NM	NM	0.009
	10/13/1998	NM	NM	0.031	NM	0.048	0.061	NM	NM	0.016
	4/15/1999	NM	NM	0.012	NM	0.001	0.049	NM	NM	0.015
	10/7/1999	NM	NM	0.009	NM	0.026	0.067	NM	NM	0.018
	10/12/2000	NM	NM	<0.001	NM	0.020	0.067	NM	NM	0.016
	10/4/2001	0.013	NM	NM	0.026	0.038	0.058	NM	0.025	0.016
	10/3/2002	0.011	NM	0.005	0.025	0.015	0.060	NM	0.022	0.016
	10/15/2003	<0.001	NM	0.002	0.023	0.002	0.016	NM	0.011	0.002
Total Organic Halogens - mg/L	10/2/1996	0.032	<0.010	0.046	0.043	0.062	0.037	0.039	NM	0.027
	10/15/1997	0.030	0.023	0.024	0.011	0.020	<0.010	0.021	NM	0.031
	10/13/1998	0.060	0.014	0.046	0.014	0.044	<0.010	0.075	NM	0.030
	10/7/1999	0.034	NM	0.054	0.012	0.040	0.023	NM	NM	0.042
	10/12/2000	0.040	NM	0.100	0.030	0.220	0.010	NM	NM	0.020
	10/4/2001	0.113	NM	NM	0.045	0.092	<0.010	NM	<0.010	0.013
	10/3/2002	0.026	NM	0.097	0.026	0.111	<0.010	NM	0.066	0.018
	10/15/2003	0.024	NM	0.022	<0.010	0.059	0.035	NM	0.014	0.029
Total Phenols - mg/L HAL - 4 mg/L	10/2/1996	0.023	0.022	0.022	<0.020	<0.020	0.021	<0.020	NM	0.023
	10/15/1997	0.545	0.202	<0.020	<0.020	0.586	0.370	0.048	NM	0.093
	10/13/1998	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	NM	<0.020
	10/7/1999	0.020	NM	<0.020	<0.020	<0.020	<0.020	NM	NM	<0.020
	10/12/2000	<0.100	NM	<0.100	<0.100	<0.100	<0.100	NM	NM	<0.100
	10/4/2001	<0.100	NM	NM	<0.100	<0.100	<0.100	NM	<0.100	<0.100
	10/3/2002	<0.100	NM	<0.100	<0.100	<0.100	<0.100	NM	<0.100	<0.100
	10/15/2003	0.022	NM	<0.020	<0.020	<0.020	<0.020	NM	<0.020	0.196
Barium, Dissolved - mg/L MCL - 2 mg/L HAL - 2 mg/L	10/2/1996	0.075	0.328	0.048	0.170	0.046	1.00	0.681	NM	0.230
	1/27/1997	0.074	0.318	0.046	0.202	0.052	1.10	0.620	NM	0.210
	4/15/1997	0.173	0.134	0.064	0.218	0.048	0.953	0.373	NM	0.210
	7/23/1997	0.091	0.332	0.073	0.181	0.044	0.897	0.678	NM	0.170
Benzene - ug/L MCL - 5 ug/L NRL - 1 ug/L	10/2/1996	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
	1/27/1997	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NM	<0.5
	4/15/1997	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NM	<0.5
	7/23/1997	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NM	<0.5
Cadmium, Dissolved - mg/L MCL - 0.005 mg/L HAL - 0.005 mg/L	10/2/1996	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	NM	<0.001
	1/27/1997	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	NM	<0.001
	4/15/1997	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	NM	<0.001
	7/23/1997	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	NM	<0.001
Carbon Tetrachloride - ug/L MCL - 5.0 ug/L NRL - 0.3 ug/L	10/2/1996	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
	1/27/1997	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	NM	<0.3
	4/15/1997	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	NM	<0.3
	7/23/1997	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	NM	<0.3
Chromium, Dissolved - mg/L MCL - 0.1 mg/L HAL - 0.1 mg/L	10/2/1996	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.003	NM	<0.002
	1/27/1997	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NM	<0.002
	4/15/1997	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	NM	<0.002
	7/23/1997	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NM	<0.002
Copper, Dissolved - mg/L MCL - 1.3 mg/L	10/2/1996	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	NM	<0.020
	1/27/1997	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	NM	<0.020
	4/15/1997	<0.020	<0.020	<0.020	<0.020	<0.020	<0.050	<0.050	NM	<0.020
	7/23/1997	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	NM	<0.020
Lead, Dissolved - mg/L MCL - 0.015 mg/L	10/2/1996	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	NM	<0.005
	1/27/1997	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	NM	0.006
	4/15/1997	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	NM	<0.005
	7/23/1997	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	NM	<0.004
Magnesium, Dissolved - mg/L	10/2/1996	140	70.0	130	NM	140	110	150	NM	130
	1/27/1997	130	67.0	120	120	200	110	140	NM	120
	4/15/1997	150	130	200	130	210	98.0	92.0	NM	140
	7/23/1997	120	64.0	210	94.0	190	92.0	140	NM	130
Mercury, Dissolved - mg/L MCL - 0.002 mg/L	10/2/1996	<0.000	<0.000	<0.000	0.000	0.000	0.000	<0.000	NM	<0.000
	1/27/1997	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	NM	<0.000
	4/15/1997	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	NM	<0.000
	7/23/1997	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	NM	<0.000
1,1,1-Trichloroethane - ug/L MCL - 200 ug/L HAL - 200 ug/L	10/2/1996	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
	1/27/1997	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
	4/15/1997	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
	7/23/1997	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
1,1-Dichloroethene - ug/L	10/2/1996	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
	1/27/1997	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NM	<2.0
	4/15/1997	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NM	<2.0
	7/23/1997	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<4.0	NM	<2.0

Summary of Groundwater Chemistry

Carter Lake Construction and Demolition Landfill - 78-SDP-02-80-CND

Parameter	Date	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-7R	MW-8
		DN1	UP2	DN1	UP2	DN1	UP2	UP1	UP1	DN2
1,2-Dichloroethane - ug/L MCL - 5 ug/L NRL - 0.4 ug/L	10/2/1996	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
	1/27/1997	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NM	<0.4
	4/15/1997	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NM	<0.4
	7/23/1997	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.8	NM	<0.4
1,4-Dichlorobenzene - ug/L MCL - 75 ug/L HAL - 75 ug/L	10/2/1996	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
	1/27/1997	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
	4/15/1997	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
	7/23/1997	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	NM

Notes:

NM - Parameter was not measured

< - Less than the Method Detection Limit (MDL)

ug/L - Micrograms per liter, equivalent to parts per billion at low concentrations

mg/L - Milligrams per liter, equivalent to parts per million at low concentrations

USEPA HAL - United States Environmental Protection Agency Health Advisory Level

USEPA NRL - United States Environmental Protection Agency Negligible Risk Level for Carcinogens

USEPA MCL - United States Environmental Protection Agency Maximum Contaminant Level

APPENDIX C
ANALYTICAL DATA

ANALYTICAL REPORT

Debra Stephens
BARKER, LEMAR & ASSOCIATES
1300 Cummins Road, #201
Des Moines, IA 50315

10/30/2003

Sample No.: 764701

Job No: 03.14077

Sample ID: MW-1
ANDEX 03101
ANDERSON EXCAVATING-CLOSED CARTER LAKE C&D

Date Taken:	10/15/2003	Date Received: 10/17/2003		Quantitation	Date Analyzed	Time Analyzed	Analyst	Analysis Method
	Result	Units	Flags	Limit				
Chloride, FIA	243	mg/L		5.0	10/21/2003	13:50	lbb	SM 4500-Cl E
COD, Block Digester (LL)	120	mg/L	MSO M	5.0	10/21/2003		jcf	SM 5220 D
Ammonia Nitrogen FIA	1.23	mg/L		0.20	10/20/2003	13:26	jcf	EPA 350.1
Phenols, Total(FIA)	0.022	mg/L		0.020	10/23/2003	15:38	mdk	EPA 420.2
Total Organic Halogens	0.024	mg/L Cl-		0.010	10/24/2003		sas	SW 9020B
Dissolved ICP Metals	COMPLETE				10/29/2003	18:30	heh	
Iron, Dissolved (ICP)	1.76	mg/L		0.10	10/29/2003	18:30	heh	SW 6010B
Arsenic, Diss (GFAA)	<0.0010	mg/L		0.0010	10/21/2003		llw	SW 7060A



Key to Flags:

M - Duplicate (or MS/MSD) RPD is outside of control limits.
MSO - MS and/or MSD recoveries are outside of control limits

Kristin Clay
Kristin M. Clay
Operations Manager
Iowa Lab Certification - 7

ANALYTICAL REPORT

Debra Stephens
BARKER, LEMAR & ASSOCIATES
1300 Cummins Road, #201
Des Moines, IA 50315

10/30/2003

Sample No.: 764702

Job No: 03.14077

Sample ID: MW-3
ANDEX 03101
ANDERSON EXCAVATING-CLOSED CARTER LAKE C&D

Date Taken:	10/15/2003	Date Received: 10/17/2003		Quantitation	Date Analyzed	Time Analyzed	Analyst	Analysis Method
		Result	Units	Flags	Limit			
Chloride, FIA	141	mg/L			5.0	10/21/2003	13:51	lbb SM 4500-Cl E
COD, Block Digester (LL)	36	mg/L			5.0	10/21/2003		jcf SM 5220 D
Ammonia Nitrogen FIA	<0.20	mg/L			0.20	10/20/2003	13:27	jcf EPA 350.1
Phenols, Total(FIA)	<0.020	mg/L			0.020	10/23/2003	15:39	mdk EPA 420.2
Total Organic Halogens	0.022	mg/L	Cl-		0.010	10/24/2003		sas SW 9020B
Dissolved ICP Metals	COMPLETE					10/29/2003	18:35	heh
Iron, Dissolved (ICP)	<0.10	mg/L			0.10	10/29/2003	18:35	heh SW 6010B
Arsenic, Diss (GFAA)	0.0019	mg/L			0.0010	10/21/2003		llw SW 7060A

Key to Flags:

Kristin Clay
Kristin M. Clay
Operations Manager
Iowa Lab Certification - 7

ANALYTICAL REPORT

Debra Stephens
BARKER, LEMAR & ASSOCIATES
1300 Cummins Road, #201
Des Moines, IA 50315

10/30/2003

Sample No.: 764703

Job No: 03.14077

Sample ID: MW-4
ANDEX 03101
ANDERSON EXCAVATING-CLOSED CARTER LAKE C&D

Date Taken:	10/15/2003	Date Received: 10/17/2003			Quantitation	Date Analyzed	Time Analyzed	Analyst	Analysis Method
		Result	Units	Flags	Limit				
Chloride, FIA	46.9	mg/L			5.0	10/21/2003	13:54	lbb	SM 4500-Cl E
COD, Block Digester (LL)	24	mg/L			5.0	10/21/2003		jcf	SM 5220 D
Ammonia Nitrogen FIA	2.05	mg/L			0.20	10/20/2003	13:28	jcf	EPA 350.1
Phenols, Total(FIA)	<0.020	mg/L			0.020	10/23/2003	15:43	mdk	EPA 420.2
Total Organic Halogens	<0.010	mg/L Cl-			0.010	10/24/2003		sas	SW 9020B
Dissolved ICP Metals	COMPLETE					10/29/2003	18:53	heh	
Iron, Dissolved (ICP)	21.6	mg/L			0.10	10/29/2003	18:53	heh	SW 6010B
Arsenic, Diss (GFAA)	0.0229	mg/L			0.0010	10/21/2003		llw	SW 7060A

Key to Flags:

Kristin Clay
Kristin M. Clay
Operations Manager
Iowa Lab Certification - 7

ANALYTICAL REPORT

Debra Stephens
BARKER, LEMAR & ASSOCIATES
1300 Cummins Road, #201
Des Moines, IA 50315

10/30/2003

Sample No.: 764704

Job No: 03.14077

Sample ID: MW-5
ANDEX 03101
ANDERSON EXCAVATING-CLOSED CARTER LAKE C&D

Date Taken:	10/15/2003	Date Received: 10/17/2003		Quantitation	Date Analyzed	Time Analyzed	Analyst	Analysis Method
		Result	Units	Flags	Limit			
Chloride, FIA	75.3	mg/L			5.0	10/21/2003	13:55	lbb SM 4500-Cl E
COD, Block Digester (LL)	96	mg/L			5.0	10/21/2003		jcf SM 5220 D
Ammonia Nitrogen FIA	0.50	mg/L			0.20	10/20/2003	13:29	jcf EPA 350.1
Phenols, Total(FIA)	<0.020	mg/L			0.020	10/23/2003	15:44	mdk EPA 420.2
Total Organic Halogens	0.059	mg/L	Cl-	BT	0.010	10/25/2003		sas SW 9020B
Dissolved ICP Metals	COMPLETE					10/29/2003	18:59	heh
Iron, Dissolved (ICP)	3.12	mg/L			0.10	10/29/2003	18:59	heh SW 6010B
Arsenic, Diss (GFAA)	0.0018	mg/L			0.0010	10/21/2003		llw SW 7060A

Key to Flags:

BT - Sample breakthrough to 2nd column is > 10%. Results may be biased low.



Kristin M. Clay
Operations Manager
Iowa Lab Certification - 7

ANALYTICAL REPORT

Debra Stephens
BARKER, LEMAR & ASSOCIATES
1300 Cummins Road, #201
Des Moines, IA 50315

10/30/2003

Sample No.: 764705

Job No: 03.14077

Sample ID: MW-6
ANDEX 03101
ANDERSON EXCAVATING-CLOSED CARTER LAKE C&D

Date Taken:	10/15/2003	Date Received: 10/17/2003		Quantitation	Date Analyzed	Time Analyzed	Analyst	Analysis Method
		Result	Units	Flags	Limit			
Chloride, FIA	219	mg/L			5.0	10/21/2003	13:56	lbb SM 4500-Cl E
COD, Block Digester (LL)	180	mg/l			5.0	10/21/2003		jcf SM 5220 D
Ammonia Nitrogen FIA	4.23	mg/L			0.20	10/20/2003	13:34	jcf EPA 350.1
Phenols, Total (FIA)	<0.020	mg/L			0.020	10/23/2003	15:44	mdk EPA 420.2
Total Organic Halogens	0.035	mg/L Cl-			0.010	10/25/2003		sas SW 9020B
ICP Metals Prep	D	mg/L				10/21/2003		tdo
Dissolved ICP Metals	COMPLETE					10/22/2003	22:28	heh
Iron, Dissolved (ICP)	0.13	mg/L			0.10	10/22/2003	22:28	heh SW 6010B
Arsenic, Diss (GFAA)	0.0159	mg/L			0.0010	10/27/2003		llw SW 7060A
GFAA Total Metals Digestio	D					10/22/2003		tdo

Key to Flags:

Kristin Clay
Kristin M. Clay
Operations Manager
Iowa Lab Certification - 7

ANALYTICAL REPORT

Debra Stephens
BARKER, LEMAR & ASSOCIATES
1300 Cummins Road, #201
Des Moines, IA 50315

10/30/2003

Sample No.: 764706

Job No: 03.14077

Sample ID: MW-7R
ANDEX 03101
ANDERSON EXCAVATING-CLOSED CARTER LAKE C&D

Date Taken:	10/15/2003	Date Received: 10/17/2003		Quantitation	Date Analyzed	Time Analyzed	Analyst	Analysis Method
		Result	Units	Flags	Limit			
Chloride, FIA	56.3	mg/L			5.0	10/21/2003	13:56	lbb SM 4500-Cl E
COD, Block Digester (LL)	100	mg/L			5.0	10/21/2003		jcf SM 5220 D
Ammonia Nitrogen FIA	1.98	mg/L			0.20	10/20/2003	13:34	jcf EPA 350.1
Phenols, Total (FIA)	<0.020	mg/L			0.020	10/23/2003	15:45	mdk EPA 420.2
Total Organic Halogens	0.014	mg/L Cl-			0.010	10/24/2003		sas SW 9020B
Dissolved ICP Metals	COMPLETE					10/29/2003	19:04	heh
Iron, Dissolved (ICP)	11.3	mg/L			0.10	10/29/2003	19:04	heh SW 6010B
Arsenic, Diss (GFAA)	0.0114	mg/L			0.0010	10/21/2003		llw SW 7060A

Key to Flags:

Kristin Clay
Kristin M. Clay
Operations Manager
Iowa Lab Certification - 7

ANALYTICAL REPORT

Debra Stephens
BARKER, LEMAR & ASSOCIATES
1300 Cummins Road, #201
Des Moines, IA 50315

10/30/2003

Sample No.: 764707

Job No: 03.14077

Sample ID: MW-8
ANDEX 03101
ANDERSON EXCAVATING-CLOSED CARTER LAKE C&D

Date Taken:	10/15/2003	Date Received: 10/17/2003			Quantitation	Date Analyzed	Time Analyzed	Analyst	Analysis Method
		Result	Units	Flags	Limit				
Chloride, FIA	74.1	mg/L			5.0	10/21/2003	13:57	lbb	SM 4500-Cl E
COD, Block Digester (LL)	30	mg/L			5.0	10/21/2003		jcf	SM 5220 D
Ammonia Nitrogen FIA	1.98	mg/L			0.20	10/20/2003	13:35	jcf	EPA 350.1
Phenols, Total (FIA)	0.196	mg/L			0.020	10/23/2003	15:59	mdk	EPA 420.2
Total Organic Halogens	0.029	mg/L Cl-			0.010	10/24/2003		sas	SW 9020B
Dissolved ICP Metals	COMPLETE					10/29/2003	19:08	heh	
Iron, Dissolved (ICP)	<0.10	mg/L			0.10	10/29/2003	19:08	heh	SW 6010B
Arsenic, Diss (GFAA)	0.0021	mg/L			0.0010	10/21/2003		llw	SW 7060A

Key to Flags:

Kristin Clay
Kristin M. Clay
Operations Manager
Iowa Lab Certification - 7

QUALITY CONTROL REPORT

BARKER, LEMAR & ASSOCIATES
1300 Cummins Road, #201
Des Moines, IA 50315

10/30/2003

Job Number: 03.14077

Debra Stephens

Enclosed is the Quality Control data for the following samples submitted to TestAmerica, Inc. - Cedar Falls for analysis:

Sample Number	Sample Description	Date Taken	Date Received
764701	MW-1	10/15/2003	10/17/2003
764702	MW-3	10/15/2003	10/17/2003
764703	MW-4	10/15/2003	10/17/2003
764704	MW-5	10/15/2003	10/17/2003
764705	MW-6	10/15/2003	10/17/2003
764706	MW-7R	10/15/2003	10/17/2003
764707	MW-8	10/15/2003	10/17/2003

This Quality Control report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

QUALITY CONTROL REPORT

BARKER, LEMAR & ASSOCIATES
1300 Cummins Road, #201
Des Moines, IA 50315

10/30/2003

Debra Stephens

Job Number: 03.14077

			Prep Date Analyzed	Batch Number	Run Batch Number	Analysis Method	Reporting Limit
764701	MW-1						10/15/2003
Chloride, FIA	243	mg/L	10/21/2003	920	SM 4500-Cl E	5.0	
COD, Block Digester (LL)	120	mg/L	10/21/2003	608	SM 5220 D	5.0	
Ammonia Nitrogen FIA	1.23	mg/L	10/20/2003	476	EPA 350.1	0.20	
Phenols, Total(FIA)	0.022	mg/L	10/23/2003	1305	EPA 420.2	0.020	
Total Organic Halogens	0.024	mg/L Cl-	10/24/2003	1256	SW 9020B	0.010	
Dissolved ICP Metals	COMPLETE		10/29/2003	1506			
Iron, Dissolved (ICP)	1.76	mg/L	10/29/2003	1471	SW 6010B	0.10	
Arsenic, Diss (GFAA)	<0.0010	mg/L	10/21/2003	951	SW 7060A	0.0010	
764702	MW-3						10/15/2003
Chloride, FIA	141	mg/L	10/21/2003	920	SM 4500-Cl E	5.0	
COD, Block Digester (LL)	36	mg/L	10/21/2003	608	SM 5220 D	5.0	
Ammonia Nitrogen FIA	<0.20	mg/L	10/20/2003	476	EPA 350.1	0.20	
Phenols, Total(FIA)	<0.020	mg/L	10/23/2003	1305	EPA 420.2	0.020	
Total Organic Halogens	0.022	mg/L Cl-	10/24/2003	1256	SW 9020B	0.010	
Dissolved ICP Metals	COMPLETE		10/29/2003	1506			
Iron, Dissolved (ICP)	<0.10	mg/L	10/29/2003	1471	SW 6010B	0.10	
Arsenic, Diss (GFAA)	0.0019	mg/L	10/21/2003	951	SW 7060A	0.0010	
764703	MW-4						10/15/2003
Chloride, FIA	46.9	mg/L	10/21/2003	920	SM 4500-Cl E	5.0	
COD, Block Digester (LL)	24	mg/L	10/21/2003	608	SM 5220 D	5.0	
Ammonia Nitrogen FIA	2.05	mg/L	10/20/2003	476	EPA 350.1	0.20	
Phenols, Total(FIA)	<0.020	mg/L	10/23/2003	1305	EPA 420.2	0.020	
Total Organic Halogens	<0.010	mg/L Cl-	10/24/2003	1256	SW 9020B	0.010	
Dissolved ICP Metals	COMPLETE		10/29/2003	1506			
Iron, Dissolved (ICP)	21.6	mg/L	10/29/2003	1471	SW 6010B	0.10	
Arsenic, Diss (GFAA)	0.0229	mg/L	10/21/2003	951	SW 7060A	0.0010	

QUALITY CONTROL REPORT

BARKER, LEMAR & ASSOCIATES
1300 Cummins Road, #201
Des Moines, IA 50315

10/30/2003

Debra Stephens

Job Number: 03.14077

			Prep Date Analyzed	Run Batch Number		Reporting Limit
764704	MW-5				10/15/2003	
Chloride, FIA	75.3	mg/L	10/21/2003	920	SM 4500-Cl E	5.0
COD, Block Digester (LL)	96	mg/L	10/21/2003	608	SM 5220 D	5.0
Ammonia Nitrogen FIA	0.50	mg/L	10/20/2003	476	EPA 350.1	0.20
Phenols, Total(FIA)	<0.020	mg/L	10/23/2003	1305	EPA 420.2	0.020
Total Organic Halogens	0.059	mg/L Cl-	10/25/2003	1256	SW 9020B	0.010
Dissolved ICP Metals	COMPLETE		10/29/2003	1506		
Iron, Dissolved (ICP)	3.12	mg/L	10/29/2003	1471	SW 6010B	0.10
Arsenic, Diss (GFAA)	0.0018	mg/L	10/21/2003	951	SW 7060A	0.0010
764705	MW-6				10/15/2003	
Chloride, FIA	219	mg/L	10/21/2003	920	SM 4500-Cl E	5.0
COD, Block Digester (LL)	180	mg/L	10/21/2003	608	SM 5220 D	5.0
Ammonia Nitrogen FIA	4.23	mg/L	10/20/2003	476	EPA 350.1	0.20
Phenols, Total(FIA)	<0.020	mg/L	10/23/2003	1305	EPA 420.2	0.020
Total Organic Halogens	0.035	mg/L Cl-	10/25/2003	1256	SW 9020B	0.010
ICP Metals Prep	D	mg/L	10/21/2003	3630		
Dissolved ICP Metals	COMPLETE		10/22/2003	1499		
Iron, Dissolved (ICP)	0.13	mg/L	10/22/2003	1463	SW 6010B	0.10
Arsenic, Diss (GFAA)	0.0159	mg/L	10/27/2003	952	SW 7060A	0.0010
GFAA Total Metals Digestion	D		10/22/2003	2790		
764706	MW-7R				10/15/2003	
Chloride, FIA	56.3	mg/L	10/21/2003	920	SM 4500-Cl E	5.0
COD, Block Digester (LL)	100	mg/L	10/21/2003	608	SM 5220 D	5.0
Ammonia Nitrogen FIA	1.98	mg/L	10/20/2003	476	EPA 350.1	0.20
Phenols, Total(FIA)	<0.020	mg/L	10/23/2003	1305	EPA 420.2	0.020
Total Organic Halogens	0.014	mg/L Cl-	10/24/2003	1256	SW 9020B	0.010
Dissolved ICP Metals	COMPLETE		10/29/2003	1506		

QUALITY CONTROL REPORT

BARKER, LEMAR & ASSOCIATES
1300 Cummins Road, #201
Des Moines, IA 50315

10/30/2003

Debra Stephens

Job Number: 03.14077

			Date Analyzed	Prep Batch Number	Run Batch Number	Analysis Method	Reporting Limit
764706	MW-7R					10/15/2003	
Iron, Dissolved (ICP)	11.3	mg/L	10/29/2003	1471	SW 6010B	0.10	
Arsenic, Diss (GFAA)	0.0114	mg/L	10/21/2003	951	SW 7060A	0.0010	
764707	MW-8					10/15/2003	
Chloride, FIA	74.1	mg/L	10/21/2003	920	SM 4500-Cl E	5.0	
COD, Block Digester (LL)	30	mg/L	10/21/2003	608	SM 5220 D	5.0	
Ammonia Nitrogen FIA	1.98	mg/L	10/20/2003	476	EPA 350.1	0.20	
Phenols, Total(FIA)	0.196	mg/L	10/23/2003	1305	EPA 420.2	0.020	
Total Organic Halogens	0.029	mg/L Cl-	10/24/2003	1256	SW 9020B	0.010	
Dissolved ICP Metals	COMPLETE		10/29/2003	1506			
Iron, Dissolved (ICP)	<0.10	mg/L	10/29/2003	1471	SW 6010B	0.10	
Arsenic, Diss (GFAA)	0.0021	mg/L	10/21/2003	951	SW 7060A	0.0010	

QUALITY CONTROL REPORT BLANKS

BARKER, LEMAR & ASSOCIATES
1300 Cummins Road, #201
Des Moines, IA 50315

10/30/2003

Debra Stephens

Job Number: 03.14077

Analyte	Prep	Run	Blank	Analysis	Units	Date Analyzed	Analyst
	Batch Number	Batch Number					
Chloride, FIA		920	<5.0	mg/L	10/21/2003	lbb	
COD, Block Digester (LL)		608	<5.0	mg/L	10/21/2003	jcf	
Ammonia Nitrogen FIA		476	<0.20	mg/L	10/20/2003	jcf	
Phenols, Total(FIA)		1305	<0.020	mg/L	10/23/2003	mdk	
Total Organic Halogens		1256	<0.010	mg/L	10/22/2003	sas	
Total Organic Halogens		1256	<0.010	mg/L	10/23/2003	sas	
Total Organic Halogens		1256	<0.010	mg/L	10/24/2003	sas	
Total Organic Halogens		1256	<0.010	mg/L	10/25/2003	sas	
Dissolved ICP Metals		1499	COMPLETE		10/22/2003	heh	
Iron, Dissolved (ICP)		1463	<0.10	mg/L	10/22/2003	heh	
Iron, Dissolved (ICP)		1471	<0.10	mg/L	10/29/2003	heh	
Arsenic, Diss (GFAA)		951	<0.0010	mg/L	10/21/2003	llw	
Arsenic, Diss (GFAA)		952	<0.0010	mg/L	10/27/2003	llw	

NA - Not Applicable

Advisory Control Limits for Blanks:

Metals/Wet Chemistry/ Conventional/GC - all compounds should be less than the Reporting Limit.

GC/MS - Semi-Volatiles - all compounds should be less than the Reporting Limit except for phthalates which should be less than 5 times the reporting limit.

Volatiles - Toluene, methylene chloride, acetone and chloroform should be less than 5 times the Reporting Limit. All other volatile compounds should be less than the Reporting Limit.

QUALITY CONTROL REPORT STANDARDS

BARKER, LEMAR & ASSOCIATES
1300 Cummins Road, #201
Des Moines, IA 50315

10/30/2003

Debra Stephens

Job Number: 03.14077

Prep	Run			
Analyte	Batch	Batch	CCV	LCS
	Number	Number	% Recovery	% Recovery
Chloride, FIA		920	99.2	
Chloride, FIA		920	93.5	
COD, Block Digester (LL)		608	102.0	
COD, Block Digester (LL)		608	101.6	
COD, Block Digester (LL)		608	99.6	
COD, Block Digester (LL)		608	98.9	
Ammonia Nitrogen FIA		476	95.4	
Ammonia Nitrogen FIA		476	93.0	
Ammonia Nitrogen FIA		476	95.6	
Ammonia Nitrogen FIA		476	93.3	
Ammonia Nitrogen FIA		476	92.0	
Ammonia Nitrogen FIA		476	94.0	
Phenols, Total(FIA)		1305	96.0	94.0
Phenols, Total(FIA)		1305	97.0	
Phenols, Total(FIA)		1305	50.0	
Phenols, Total(FIA)		1305	100.2	
Total Organic Halogens		1256	98.8	80.0
Total Organic Halogens		1256	99.0	sas
Total Organic Halogens		1256	99.4	
Dissolved ICP Metals		1499		100.0
Iron, Dissolved (ICP)		1463	99.4	100.0
Iron, Dissolved (ICP)		1463	99.8	heh
Iron, Dissolved (ICP)		1463	98.4	
Iron, Dissolved (ICP)		1471	102.6	
Iron, Dissolved (ICP)		1471	101.2	
Iron, Dissolved (ICP)		1471	101.2	
Arsenic, Diss (GFAA)		951	100.4	
Arsenic, Diss (GFAA)		951	98.7	
Arsenic, Diss (GFAA)		952	104.7	111.8
				llw

CCV - Continuing Calibration Verification

LCS - Laboratory Control Standard

NA - Not Applicable

QUALITY CONTROL REPORT DUPLICATES/SPIKES

BARKER, LEMAR & ASSOCIATES
1300 Cummins Road, #201
Des Moines, IA 50315

10/30/2003

Debra Stephens

Job Number: 03.14077

Analyte	Prep	Run	Original Analysis	Duplicate Analysis	Units	RPD	Spike	Percent Recovery
	Batch Number	Batch Number					Result	
Dissolved ICP Metals		1506	COMPLETE				COMPLETE	
Iron, Dissolved (ICP)		1471	<0.10	<0.10	mg/L		1.92	mg/L 100.0
Iron, Dissolved (ICP)							1.88	mg/L 97.9
Arsenic, Diss (GFAA)		951	<0.0010	<0.0010	mg/L		0.0262	mg/L 108.8

NOTE: Spikes and Duplicates may not be samples from this job.

NA - Not Applicable

RPD - Relative Percent Difference

Advisory Control Limits for Duplicates - RPD should be less than 20.

Advisory Control Limits for Spikes - Spike recovery should be 75 - 125%.

QUALITY CONTROL REPORT MATRIX SPIKE/MATRIX SPIKE DUPLICATE

BARKER, LEMAR & ASSOCIATES
1300 Cummins Road, #201
Des Moines, IA 50315

10/30/2003

Debra Stephens

Job Number: 03.14077

Analyte	Prep Batch Number	Run Batch Number	Analysis Result	MS Units	MS Result	MSD % Recovery	MSD Result	MSD % Recovery	MS/MSD RPD
Chloride, FIA		920	5.3	mg/L	29.6	97.2	29.0	94.8	2.0
COD, Block Digester (LL)		608	120	mg/L	266.0	97.3	295.6	117.1	10.5
Ammonia Nitrogen FIA		476	0.51	mg/L	9.1	85.9	9.1	85.9	0.0
Phenols, Total(FIA)		1305	<0.020	mg/L	0.097	97.0	0.100	100.0	3.0
Total Organic Halogens		1256	<0.010	mg/L C	0.09897	99.0	0.10449	104.5	5.4
Dissolved ICP Metals		1499	COMPLETE						
Iron, Dissolved (ICP)		1463	3.8	mg/L	6.11	115.5	6.02	111.0	1.5
Arsenic, Diss (GFAA)		952	0.0046	mg/L	0.0389	85.8	0.0398	88.0	2.3

NOTE: Matrix Spike Samples may not be samples from this job.

NA = Not Applicable

MS = Matrix Spike

MSD = Matrix Spike Duplicate

RPD = Relative Percent Difference

Page 16 of 16

TestAmerica Job Number: 03.14077

ATTACHMENTS

Following are the sample receipt log and the chain of custody applicable to this analytical report.

Any abnormalities or departures from sample acceptance policy shall be documented on the "Sample Receipt and Temperature Log Form" and Sample Non-Conformance Form" (if applicable) included with this report.

For information concerning certifications of this facility or another TestAmerica facility please visit our website at www.TestAmericaInc.com.

This data has been produced in compliance with 2001 NELAC Standards (July 2003), except where noted.

This report shall not be reproduced, except in full, without written approval of the laboratory.

For questions regarding this report, please contact the individual who signed the analytical report.

Test America

Incorporated

704 Enterprise Drive
Cedar Falls, Iowa 50613

Phone: 319-277-2401
Fax: 515-792-7989

or 1-800-750-2401

SAMPLER: Barker Lemar Engineering Consultants
SITE NAME: Anderson Excavating & Wrecking, Closed Carter Lake C&D Landfill
ADDRESS: 1300 Cummins Road Suite 201
CITY/STATE/ZIP: Des Moines, IA 50315
TELEPHONE NUMBER: 515-256-8814 Fax: 515-256-0152
SAMPLED BY: (PRINT NAME) Mike Marks
SIGNATURE: *Mike Marks*

REPORT TO:
NAME: Debra Stephens
COMPANY NAME: Barker Lemar Engineering Consultants
PROJECT NAME: Anderson Excavating & Wrecking, Closed Carter Lake C&D Landfill
PROJECT NUMBER: ANDEX 03101
ADDRESS: 1300 Cummins Road Suite 201
CITY/STATE/ZIP: Des Moines, IA 50315

LABORATORY WORK ORDER NO.

Sample ID	Date Sampled	Time Sampled	# of Containers Shipped	Grab	Composite	Field Filtered	Ice	Preservative				Other (Specify): _____	Groundwater	Wastewater	Drinking Water	Sludge	Soil	Other (Specify): _____	Matrix			Analyze For:			Standard TAT	Fax Results	LABORATORY SAMPLE NUMBER						
								HNO ₃ (Red & White Label)	HCl (Blue & White Label)	NaOH (Orange & White Label)	H ₂ SO ₄ , Plastic (Yellow & White Label)								H ₂ SO ₄ , Glass (Yellow & White Label)	Name (Black & White Label)	"a" list	"e" list	"r" list	Arsenic									
MW-1	10/15	10:45	4	G	N	X			1	2	1	X					X	X	X														
MW-3		10:00	1			X			1	2	1	X					X	X	X														
MW-4		9:45				X			1	2	1	Y					X	X	X														
MW-5		8:35				X			1	2	1	Y					X	X	X														
MW-6		9:10				X			1	2	1	Y					X	X	X														
MW-7R		8:30	10:10			X			1	2	1	X					X	X	X														
MW-8	✓	10:30	✓	✓		X			1	2	1	X					X	X	X														
SW-1		Not Sampled															X	X	X	X													
Relinquished by:	Date:	Time:	Received by:											Date:	Time:	Relinquished by:											Date:	Time:					
<i>Mike Marks</i>	10/16		Test America											10/17/03	1:30																		
Shipped Via:	Comments:										Shipped Via:																						
Received for Lab by:	Date:	Time:	Temperature Upon Receipt:										Laboratory Comments:																				
<i>Edna Muehling</i>	10-18-03	8:00																															

APPENDIX D
EXCEEDANCE TABLE

**Summary of Statistical Exceedances
Groundwater Monitoring Wells
by Well Cluster**

Page 1 of 1

Carter Lake Construction and Demolition Landfill - 78-SDP-02-80

MW-1 - Cluster DN1

Chloride

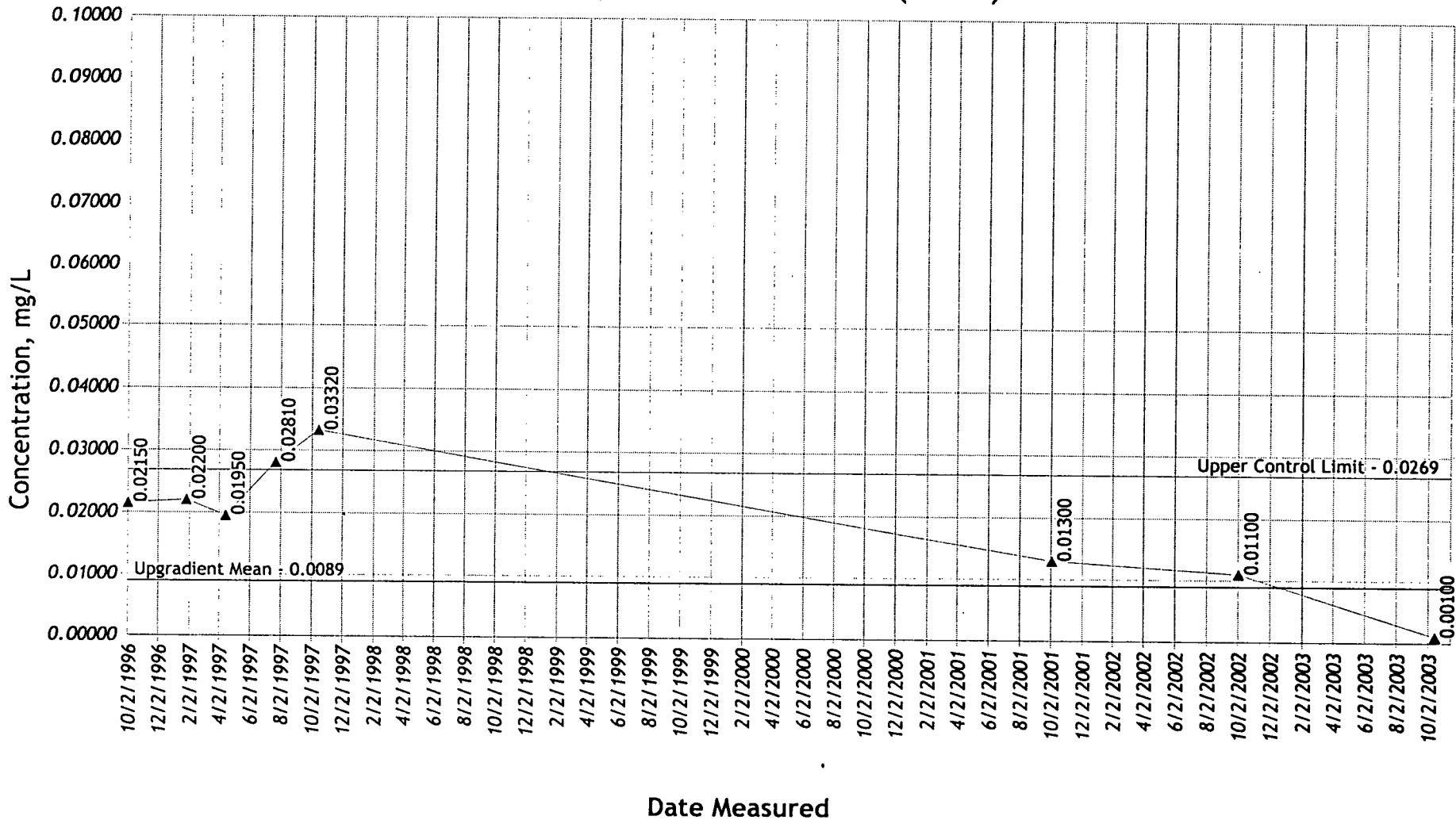
Mean: 82.9 **STD:** 31.7 **Exceedances Level:** 146.37

Current Action Levels **None Established**

10/15/2003 243 mg/L

APPENDIX E
GRAPHS OF ANALYTICAL
PARAMETERS/MONITORING POINTS

Arsenic, Dissolved Trends - (MW-1)

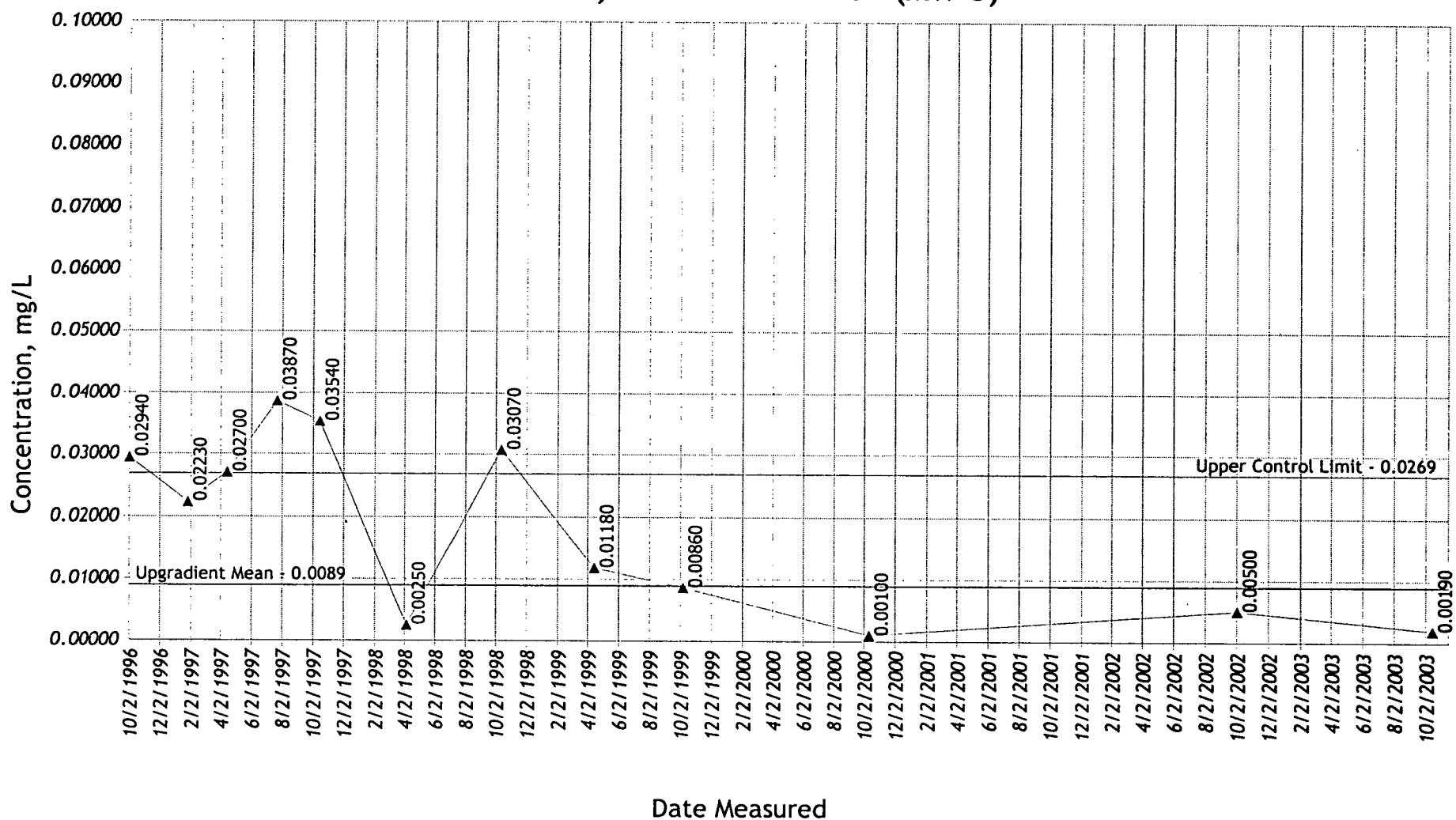


1

Arsenic, Dissolved
Carter Lake Construction and Demolition Landfill
78-SDP-02-80

03001
11/14/2003 12:31:41 PM

Arsenic, Dissolved Trends - (MW-3)

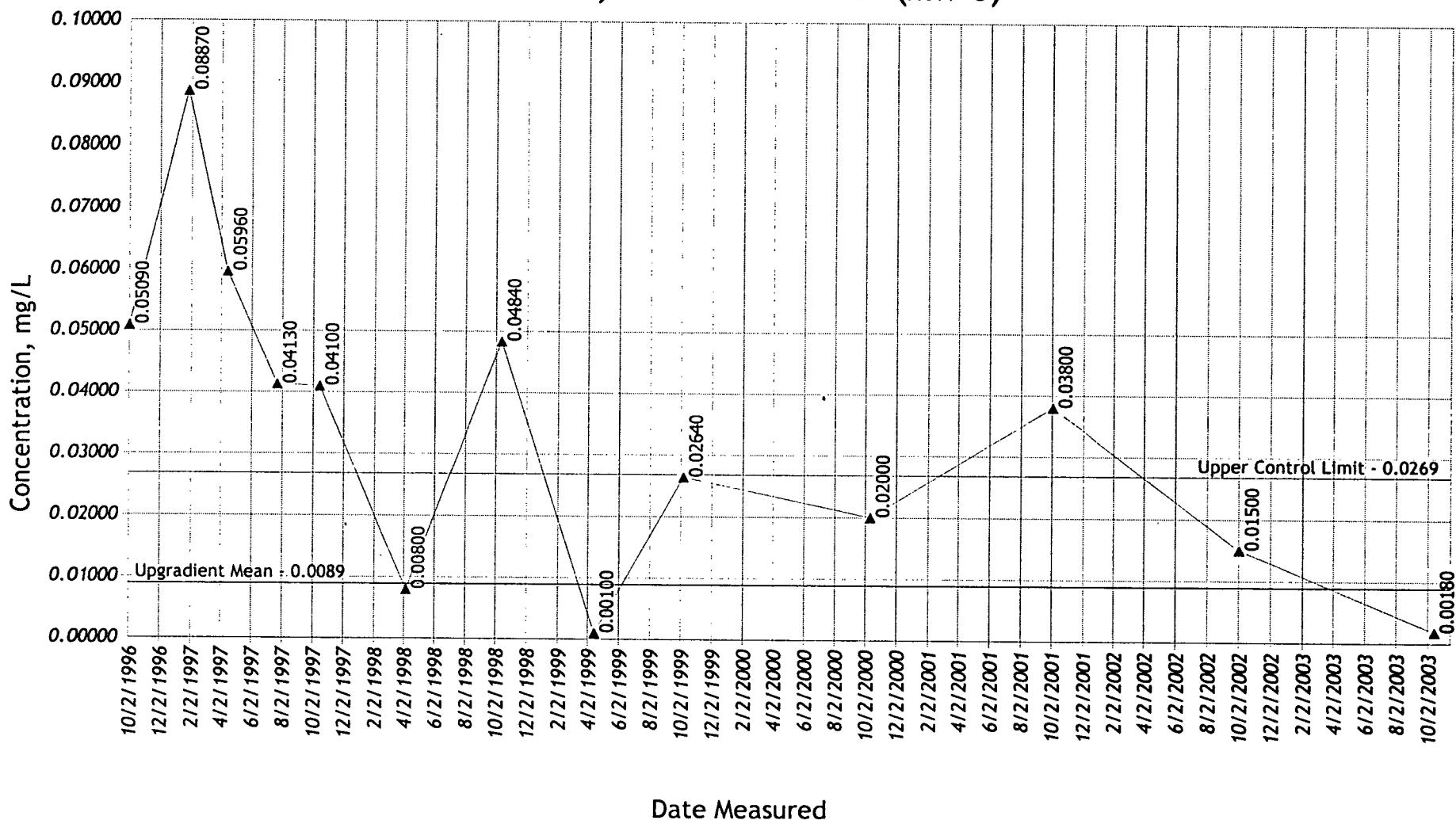


2

Arsenic, Dissolved
Carter Lake Construction and Demolition Landfill
78-SDP-02-80

03001
11/14/2003 12:31:49 PM

Arsenic, Dissolved Trends - (MW-5)

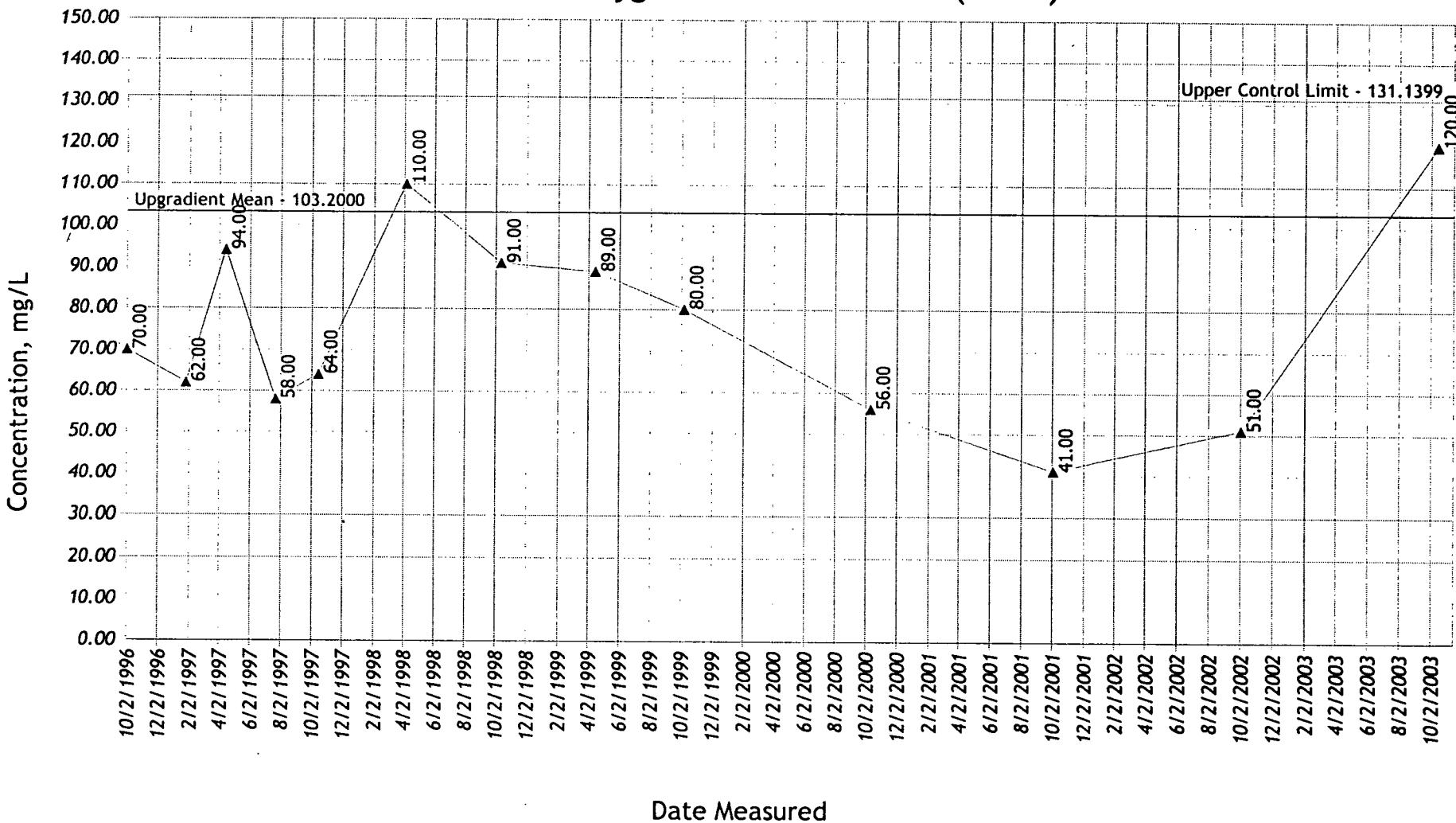


3

Arsenic, Dissolved
Carter Lake Construction and Demolition Landfill
 78-SDP-02-80

03001
 11/14/2003 12:31:56 PM

Chemical Oxygen Demand Trends - (MW-1)

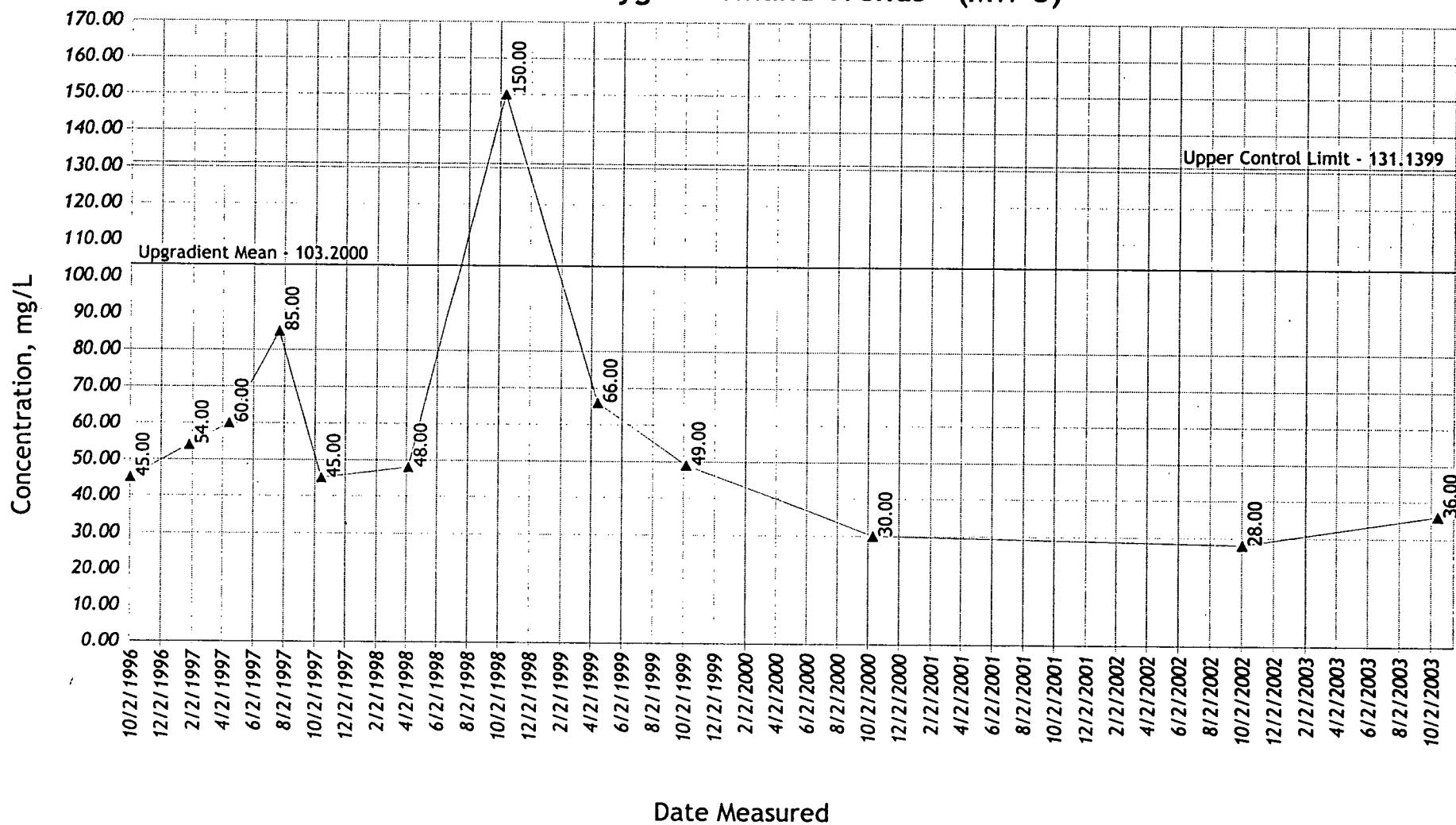


4

**Chemical Oxygen Demand
Carter Lake Construction and Demolition Landfill
78-SDP-02-80**

03001
11/14/2003 12:32:08 PM

Chemical Oxygen Demand Trends - (MW-3)

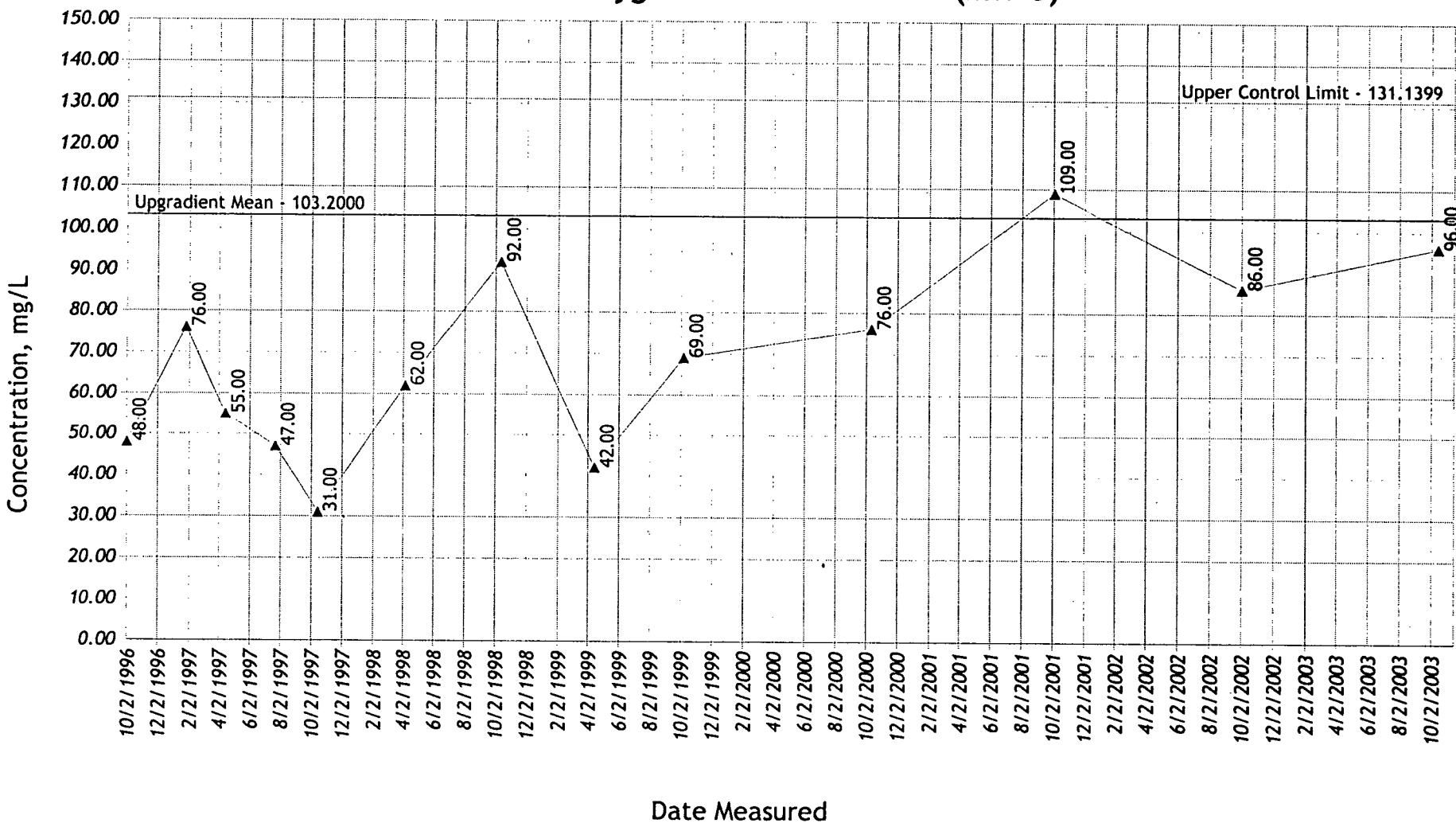


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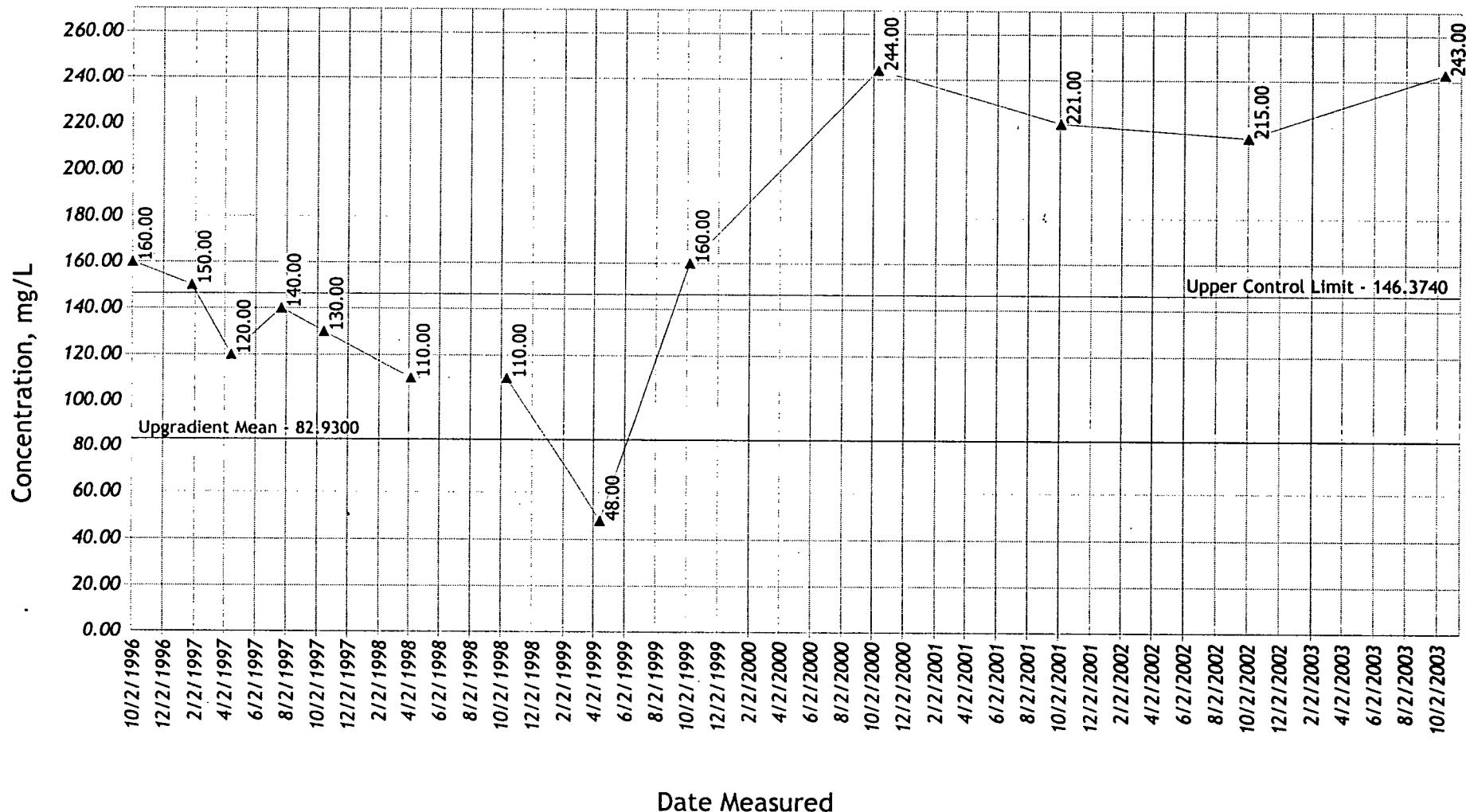
Chemical Oxygen Demand
Carter Lake Construction and Demolition Landfill
78-SDP-02-80

03001
11/14/2003 12:32:14 PM

Chemical Oxygen Demand Trends - (MW-5)



Chloride Trends - (MW-1)

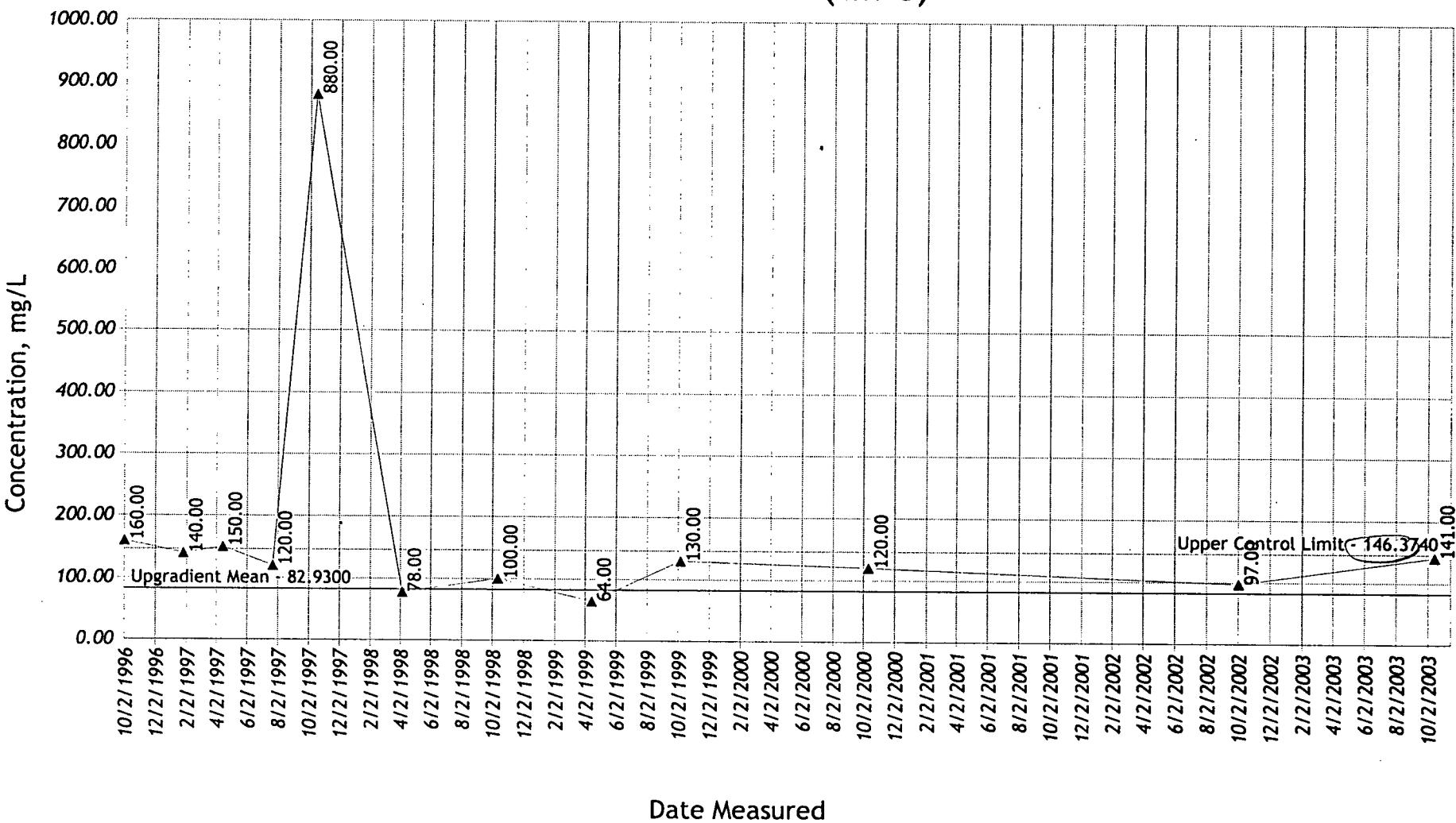


7

Chloride
Carter Lake Construction and Demolition Landfill
78-SDP-02-80

03001
11/14/2003 12:32:27 PM

Chloride Trends - (MW-3)

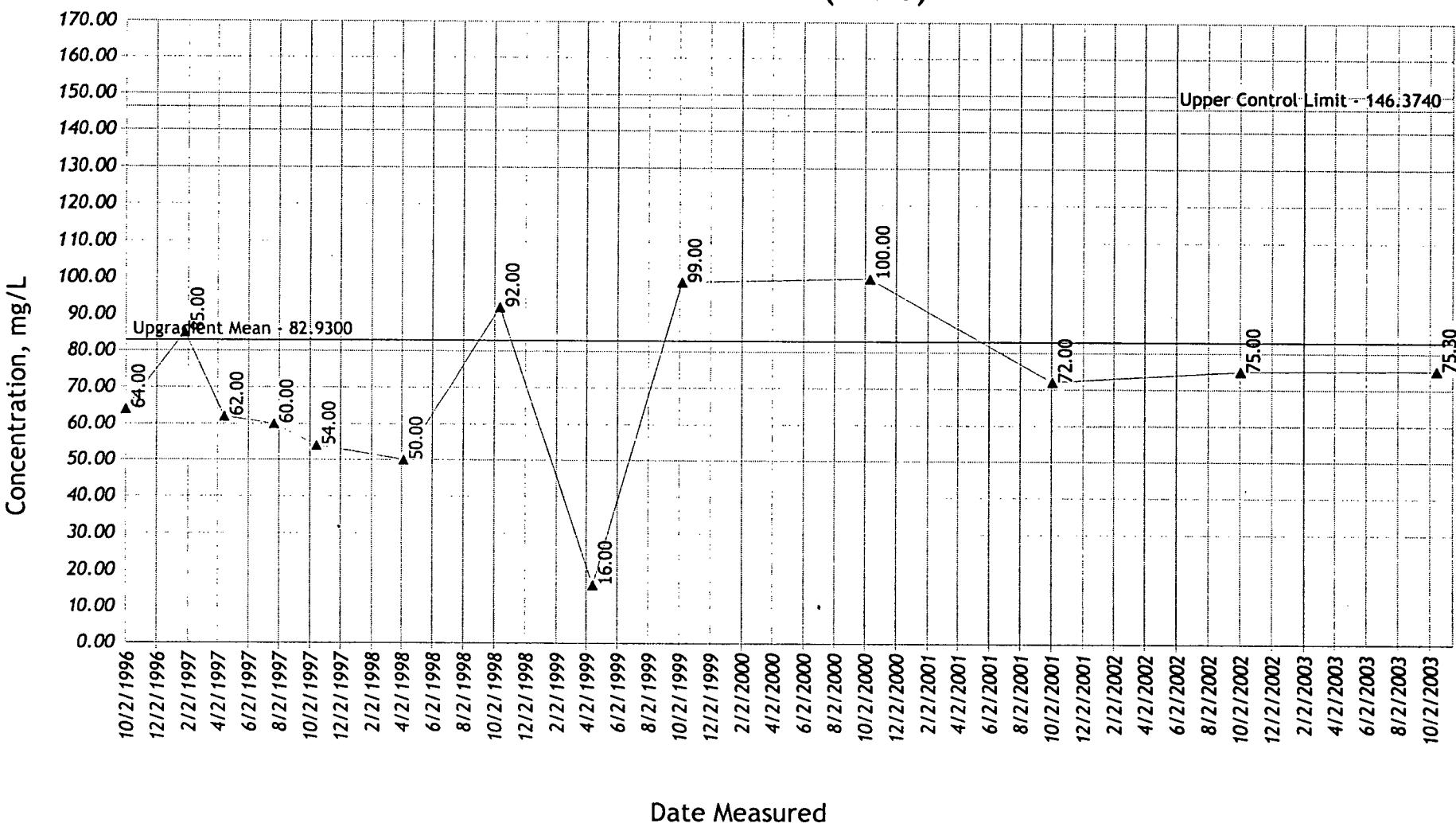


8

Chloride
Carter Lake Construction and Demolition Landfill
78-SDP-02-80

03001
11/14/2003 12:32:32 PM

Chloride Trends - (MW-5)

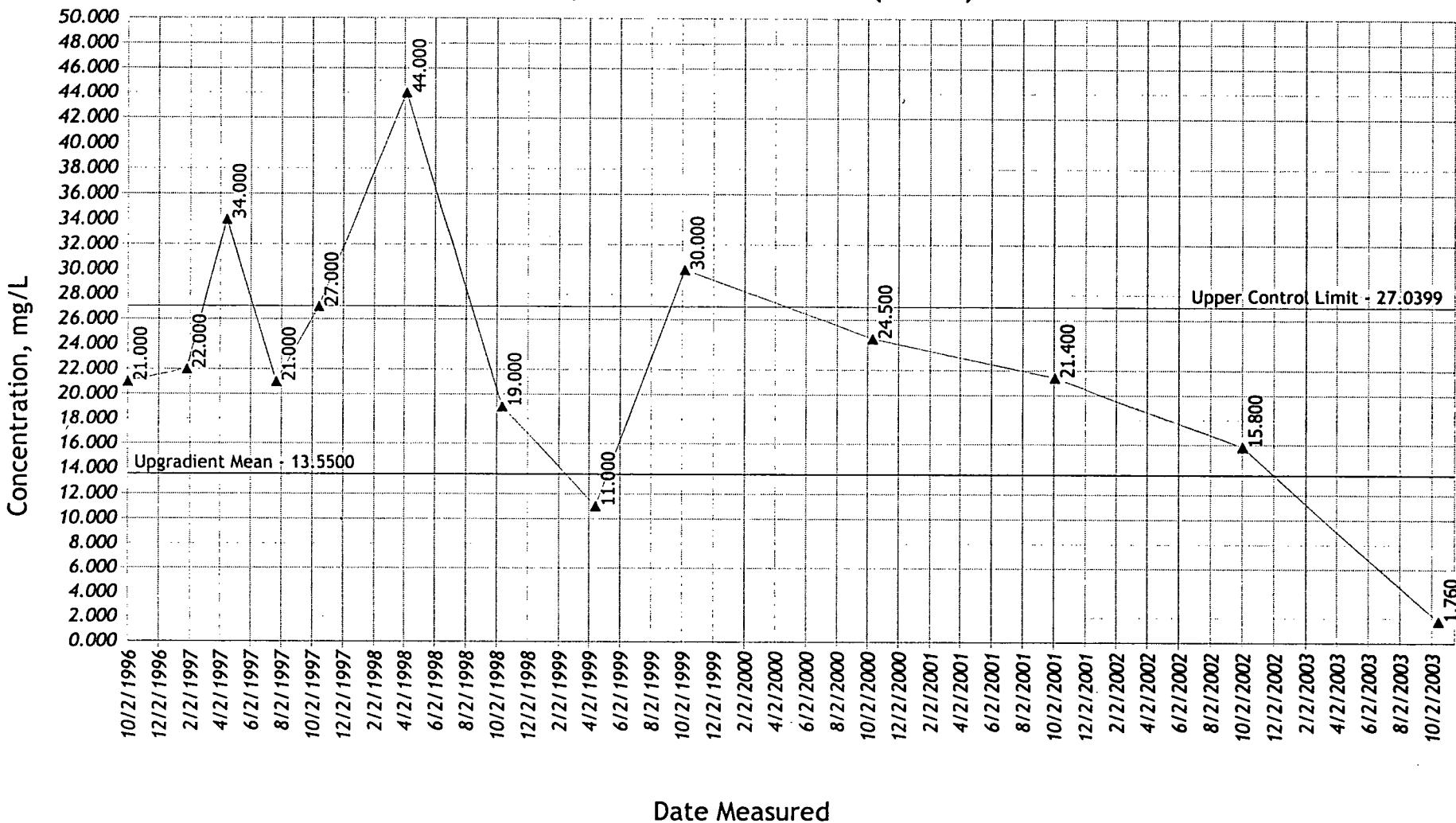


9

Chloride
Carter Lake Construction and Demolition Landfill
78-SDP-02-80

03001
11/14/2003 12:32:38 PM

Iron, Dissolved Trends - (MW-1)

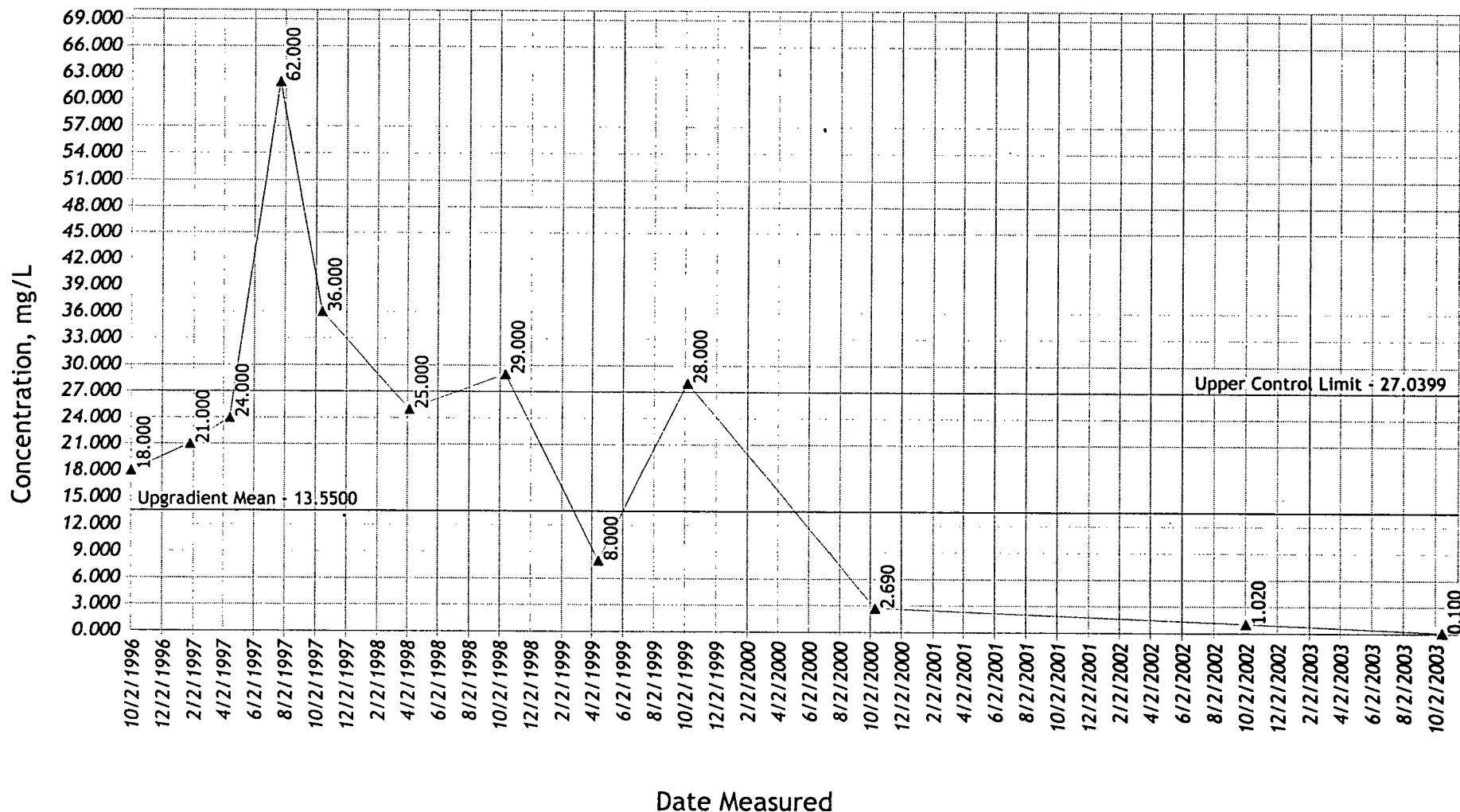


10

Iron, Dissolved
Carter Lake Construction and Demolition Landfill
78-SDP-02-80

03001
11/14/2003 12:32:48 PM

Iron, Dissolved Trends - (MW-3)

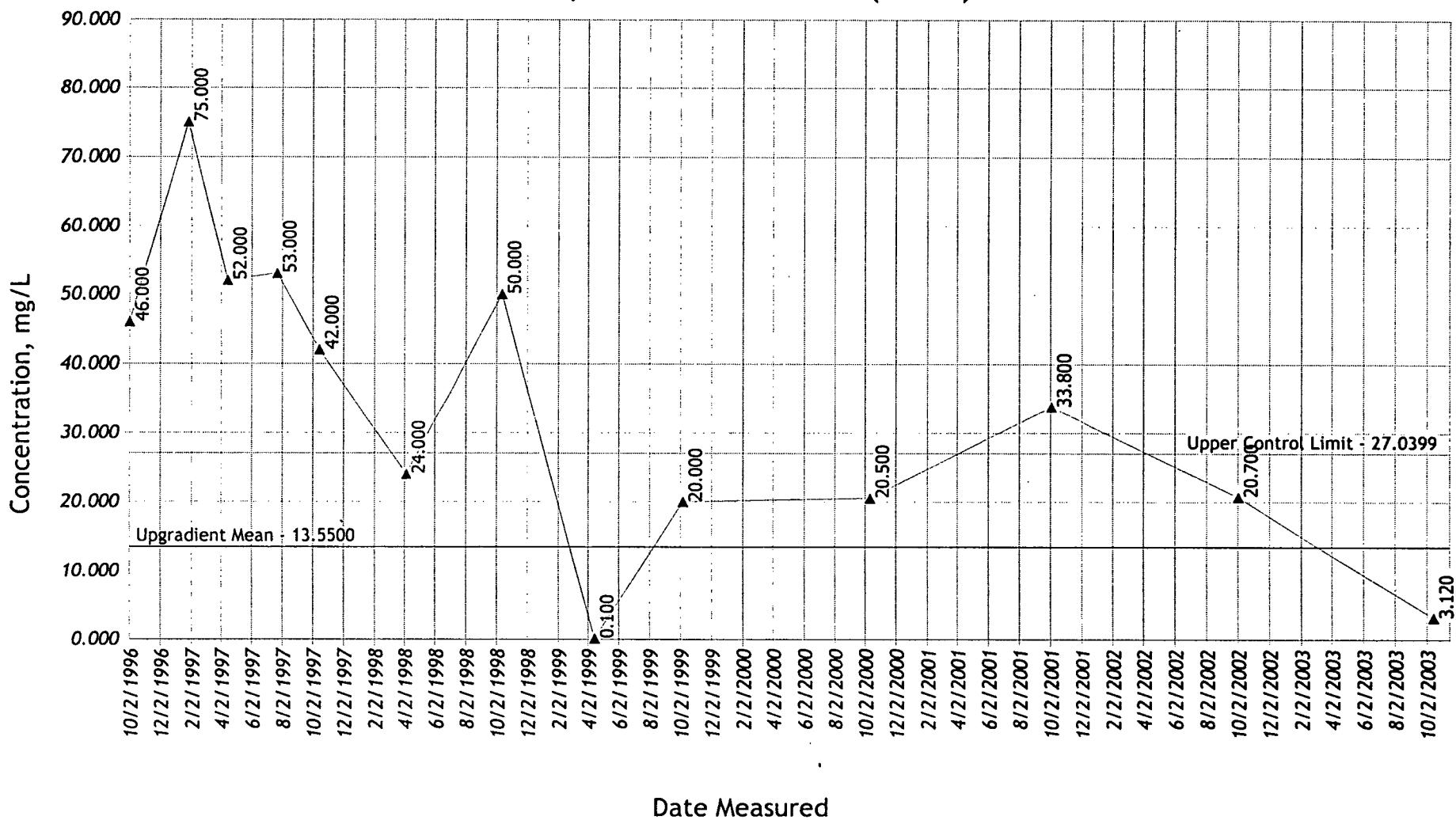


11

Iron, Dissolved
Carter Lake Construction and Demolition Landfill
78-SDP-02-80

03001
11/14/2003 12:32:54 PM

Iron, Dissolved Trends - (MW-5)

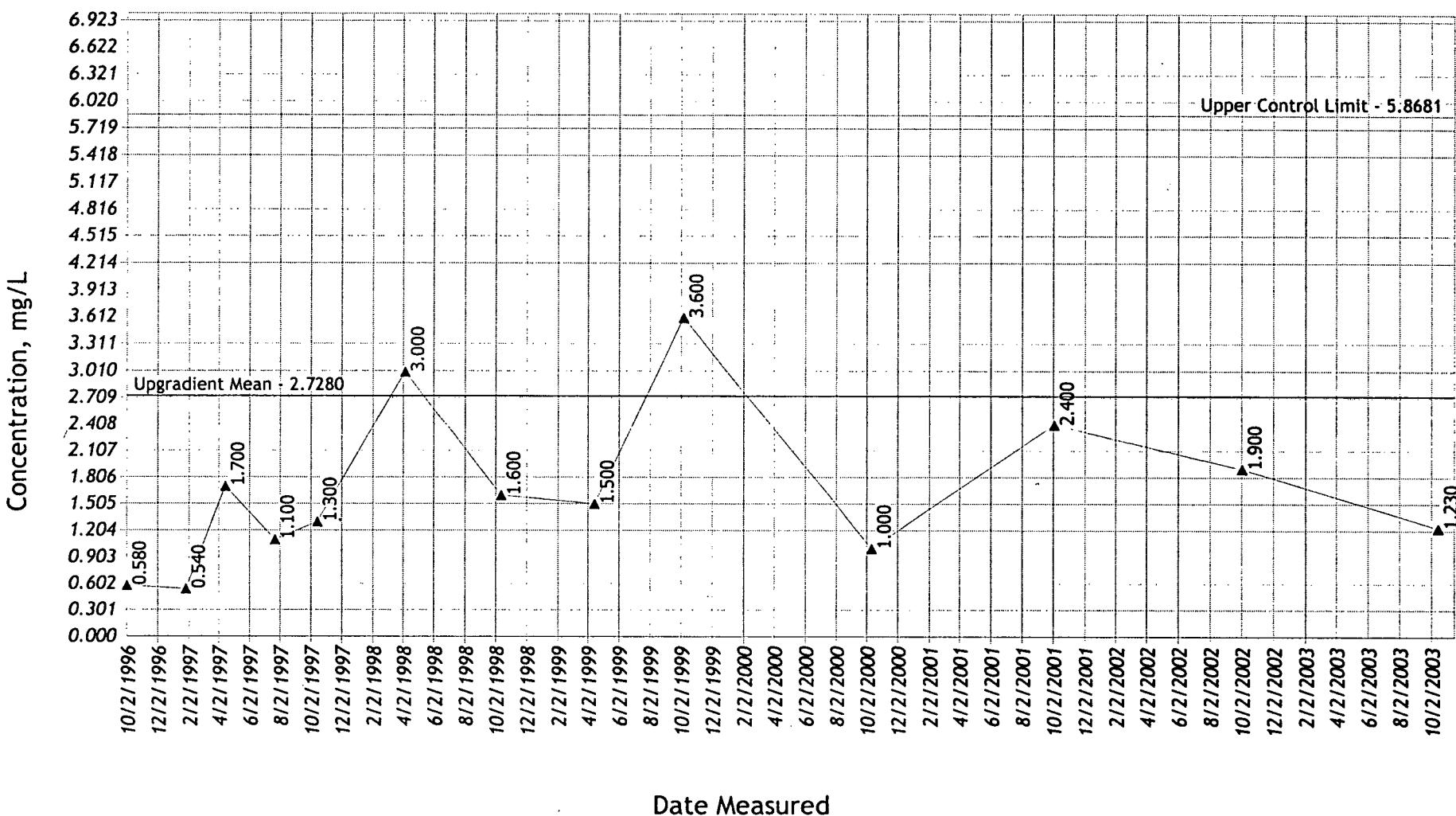


12

Iron, Dissolved
Carter Lake Construction and Demolition Landfill
78-SDP-02-80

03001
11/14/2003 12:33:01 PM

Nitrogen, Ammonia Trends - (MW-1)

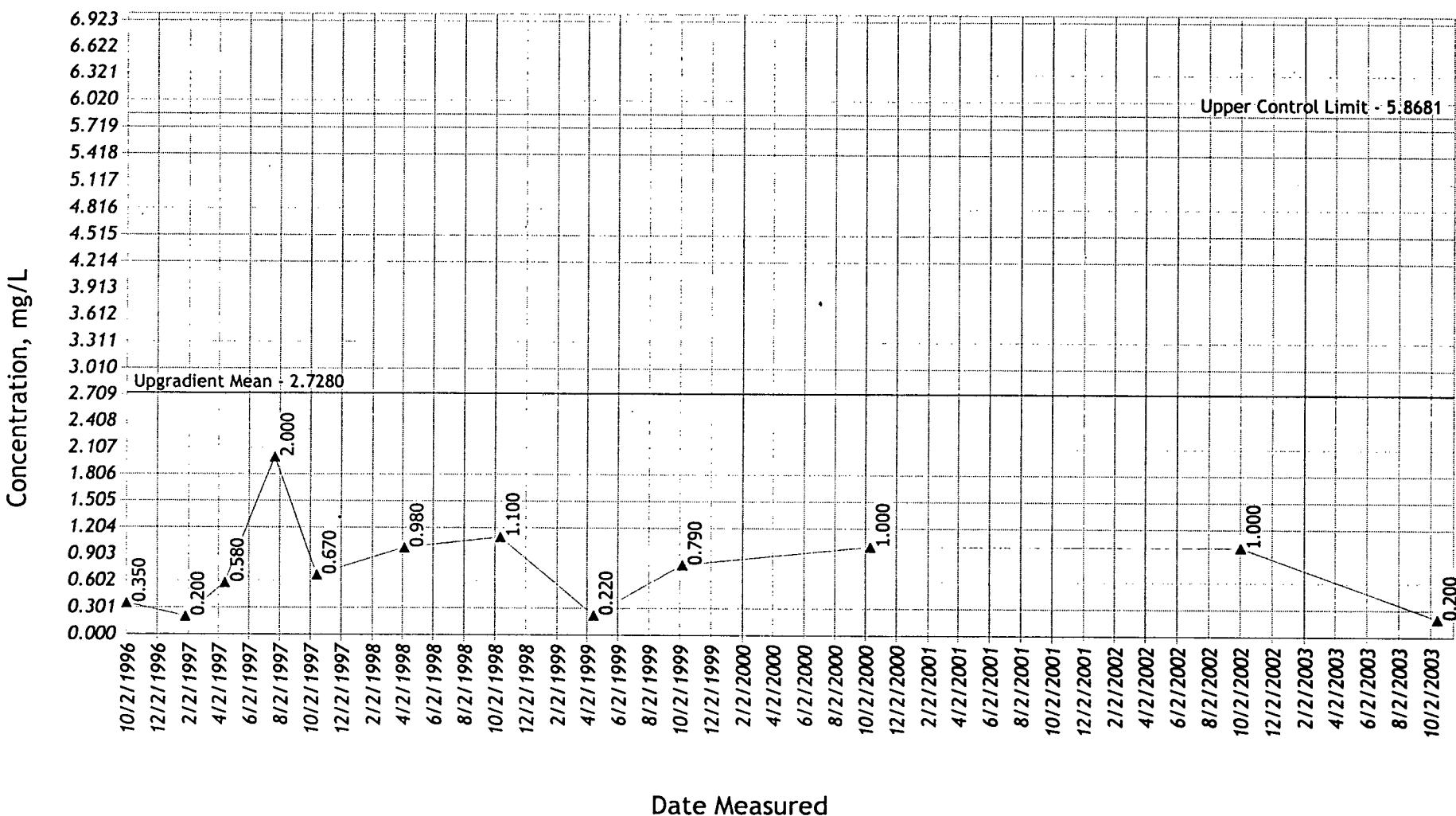


13

Nitrogen, Ammonia
Carter Lake Construction and Demolition Landfill
78-SDP-02-80

03001
11/14/2003 12:33:12 PM

Nitrogen, Ammonia Trends - (MW-3)

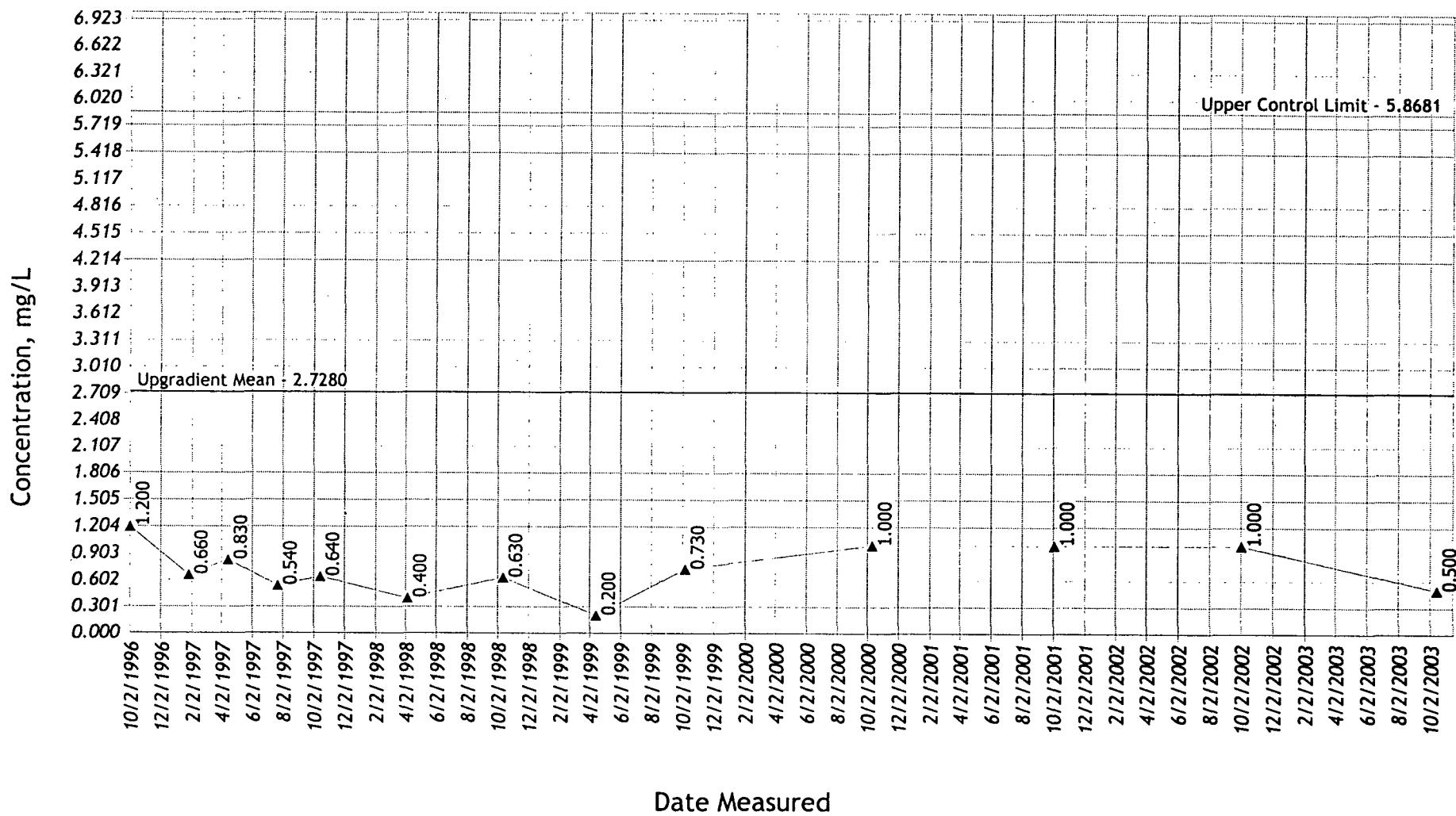


14

Nitrogen, Ammonia
Carter Lake Construction and Demolition Landfill
 78-SDP-02-80

03001
 11/14/2003 12:33:19 PM

Nitrogen, Ammonia Trends - (MW-5)

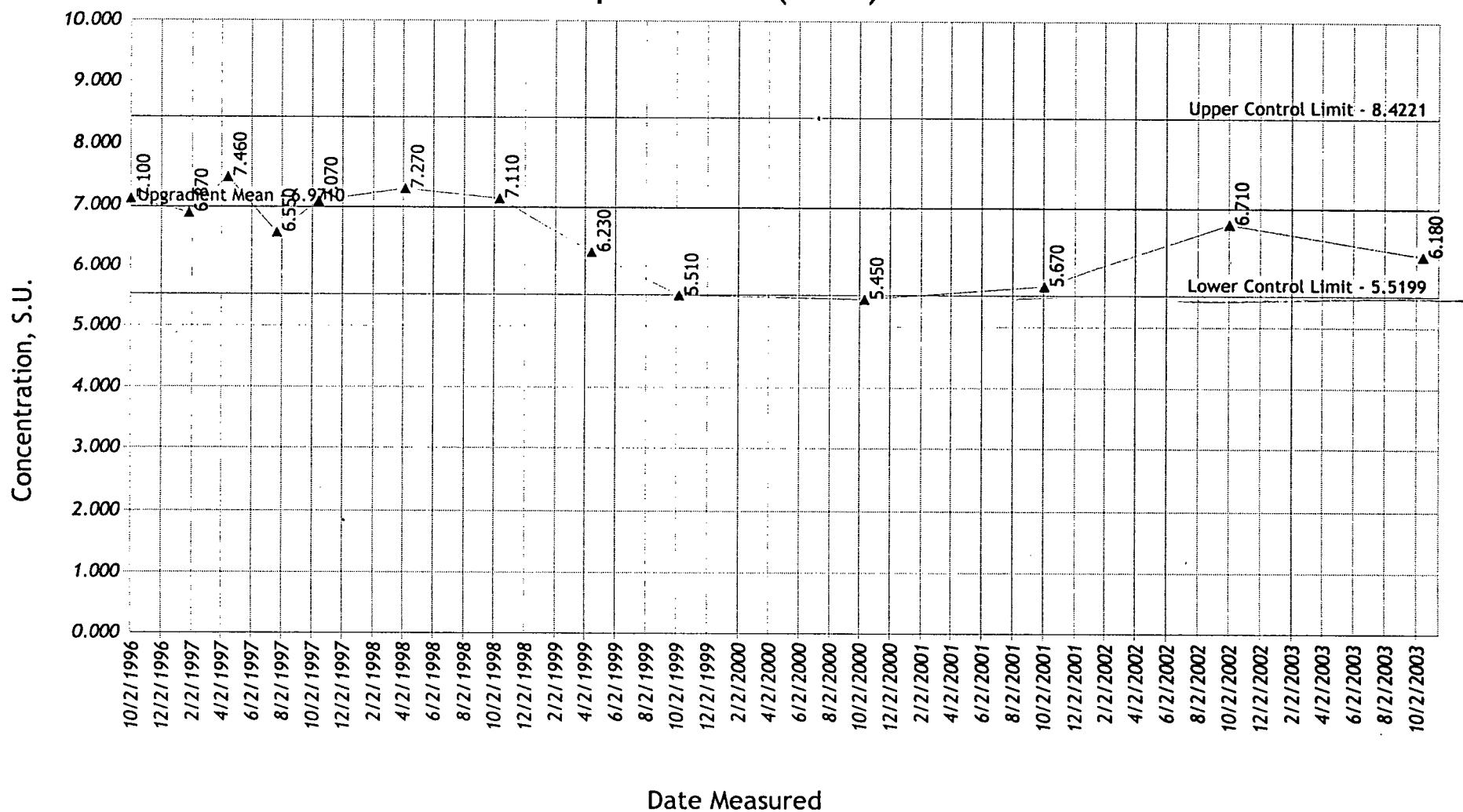


15

Nitrogen, Ammonia
Carter Lake Construction and Demolition Landfill
78-SDP-02-80

03001
11/14/2003 12:33:24 PM

pH Trends - (MW-1)



16

pH

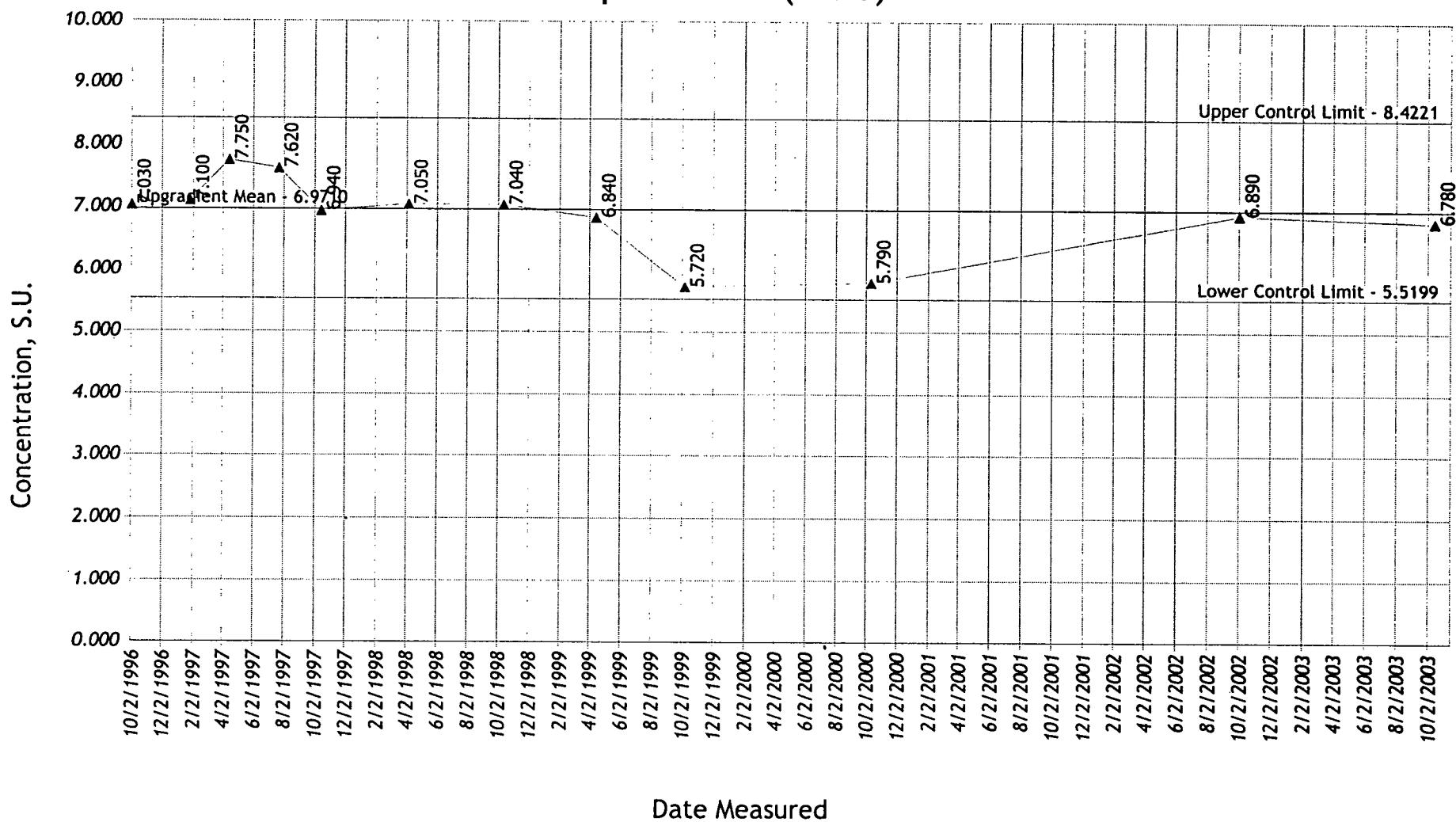
Carter Lake Construction and Demolition Landfill

78-SDP-02-80

03001

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pH Trends - (MW-3)



17

pH

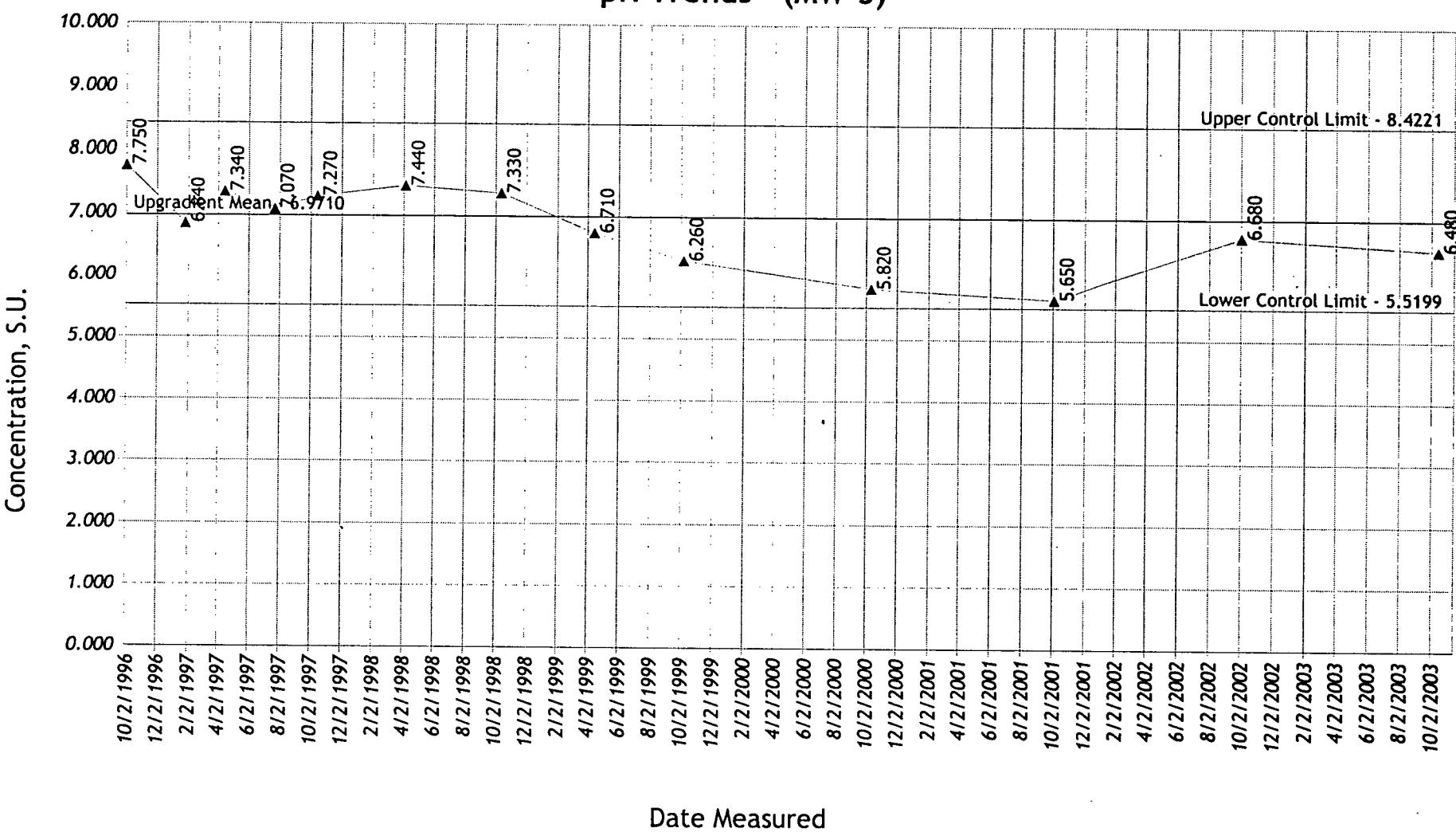
Carter Lake Construction and Demolition Landfill

78-SDP-02-80

03001

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pH Trends - (MW-5)



18

pH

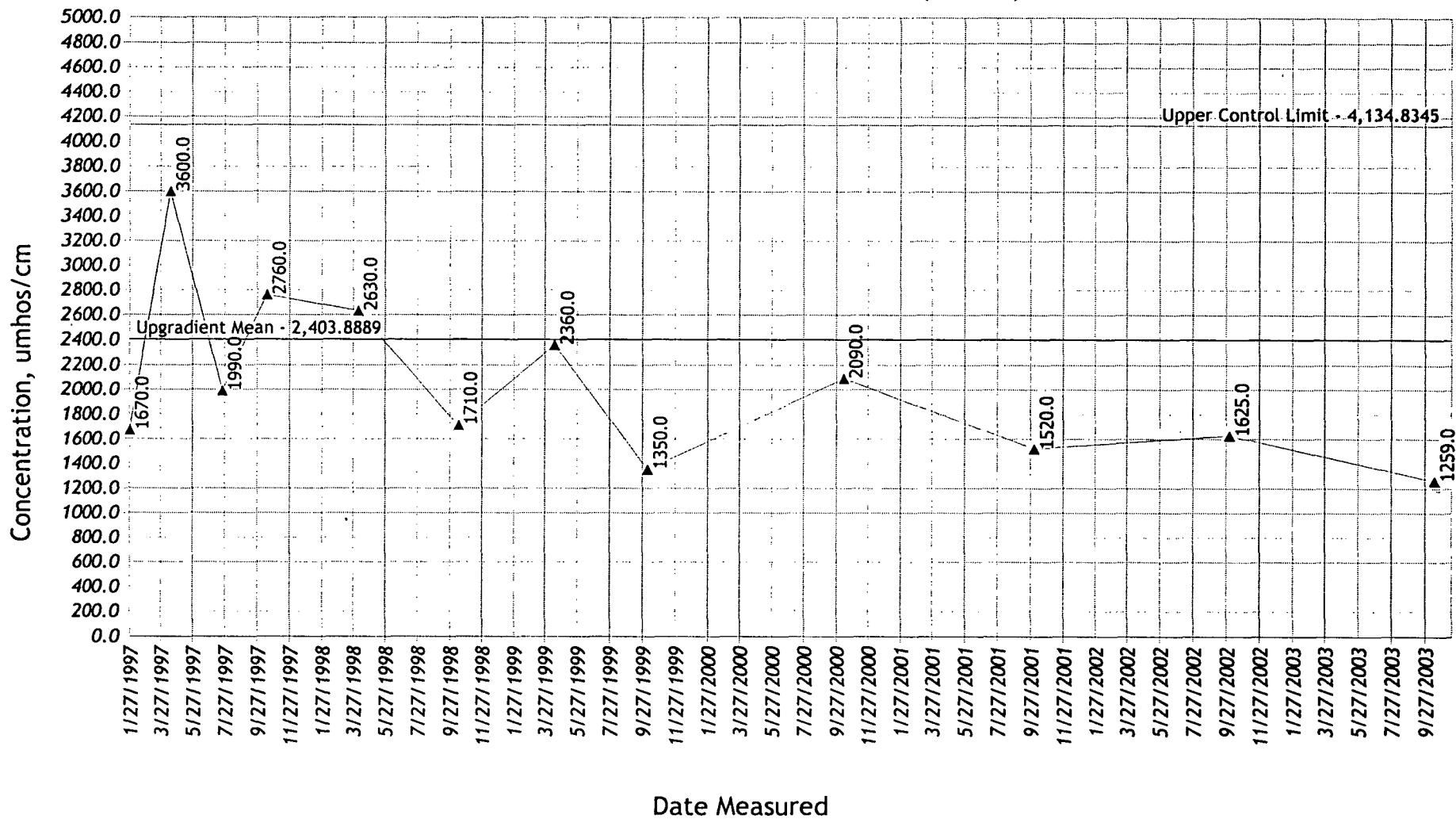
Carter Lake Construction and Demolition Landfill

78-SDP-02-80

03001

11/14/2003 12:33:42 PM

Specific Conductance Trends - (MW-1)

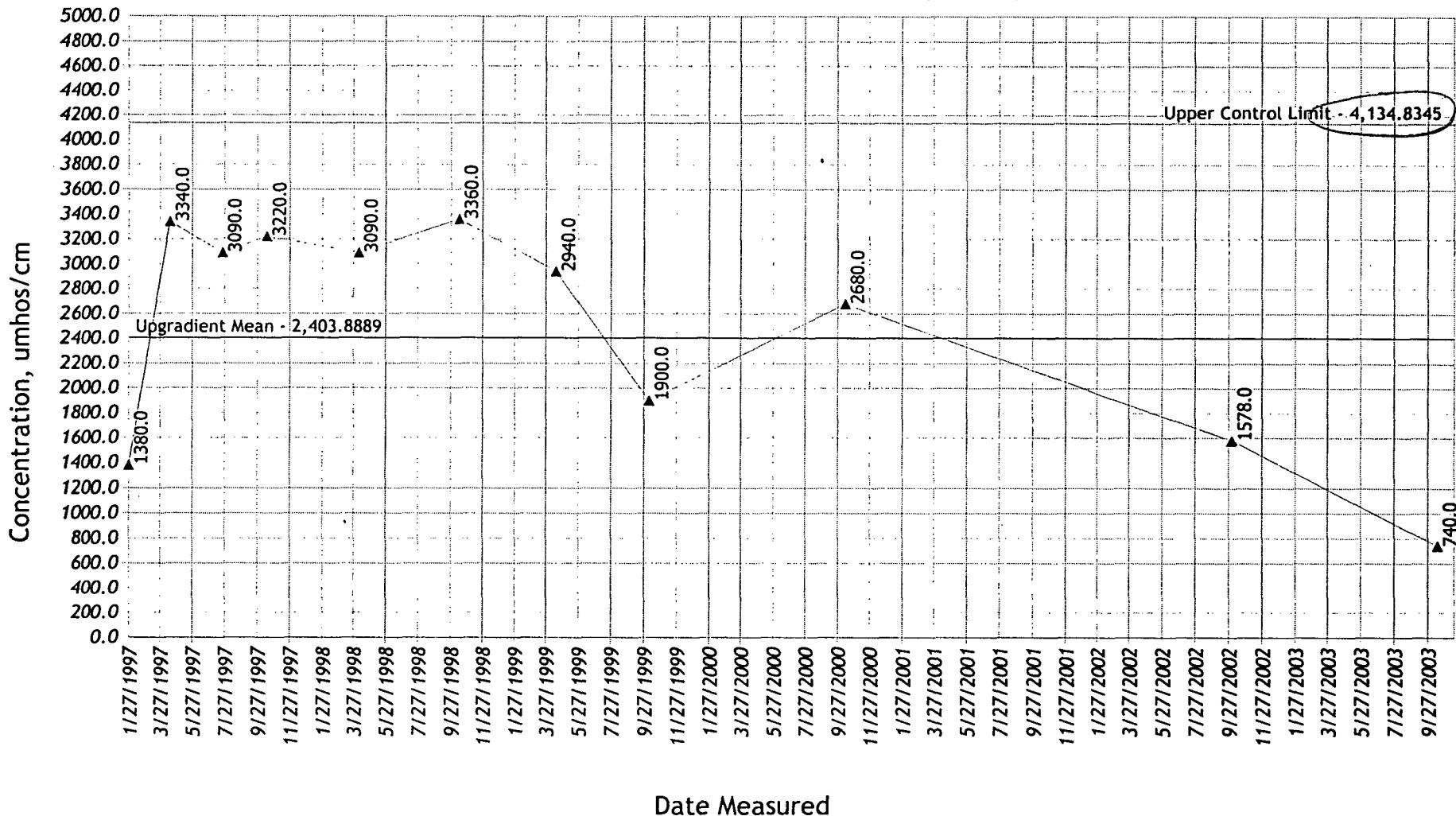


19

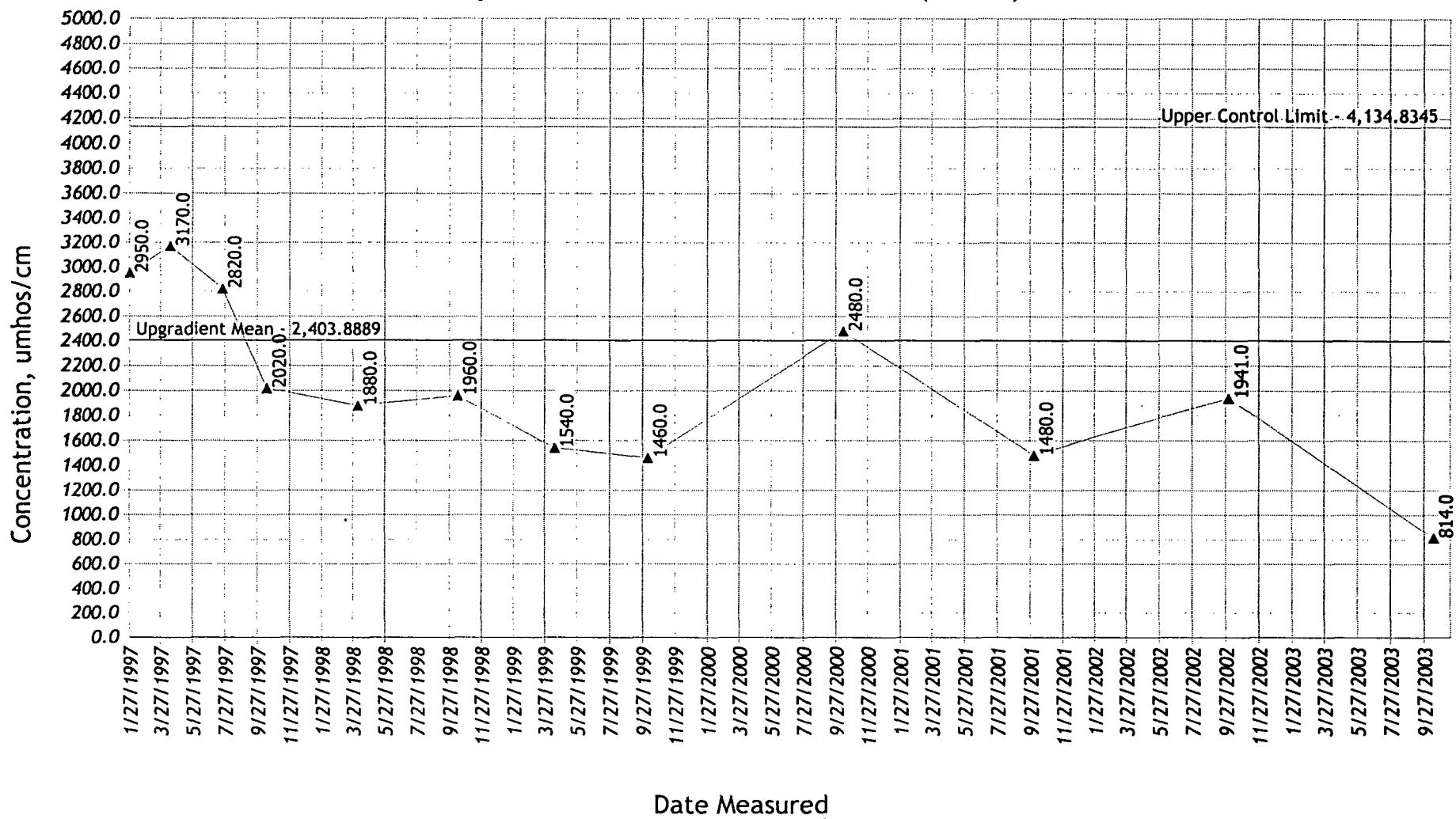
Specific Conductance
Carter Lake Construction and Demolition Landfill
78-SDP-02-80

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Specific Conductance Trends - (MW-3)



Specific Conductance Trends - (MW-5)

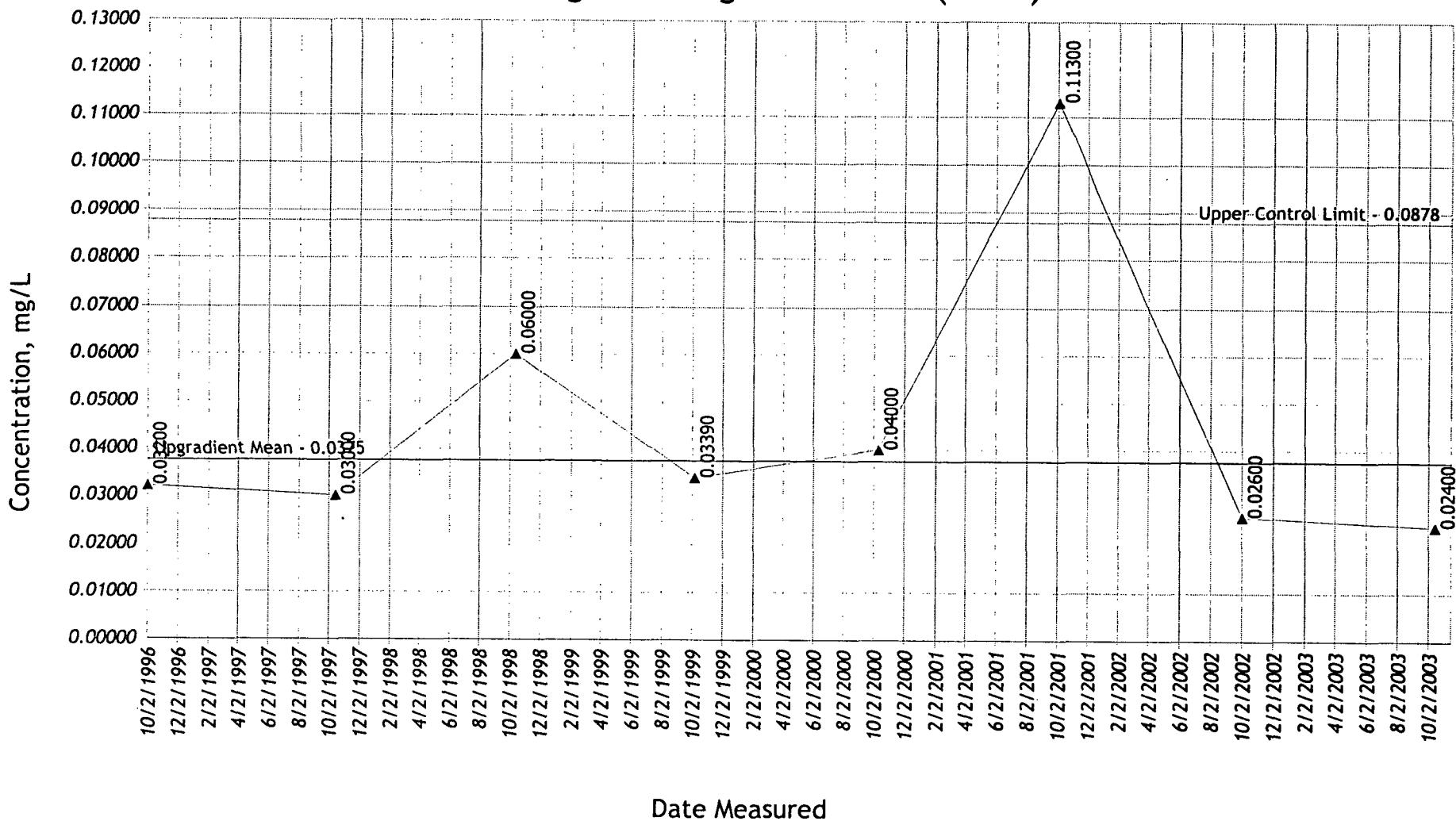


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Specific Conductance
Carter Lake Construction and Demolition Landfill
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Total Organic Halogens Trends - (MW-1)

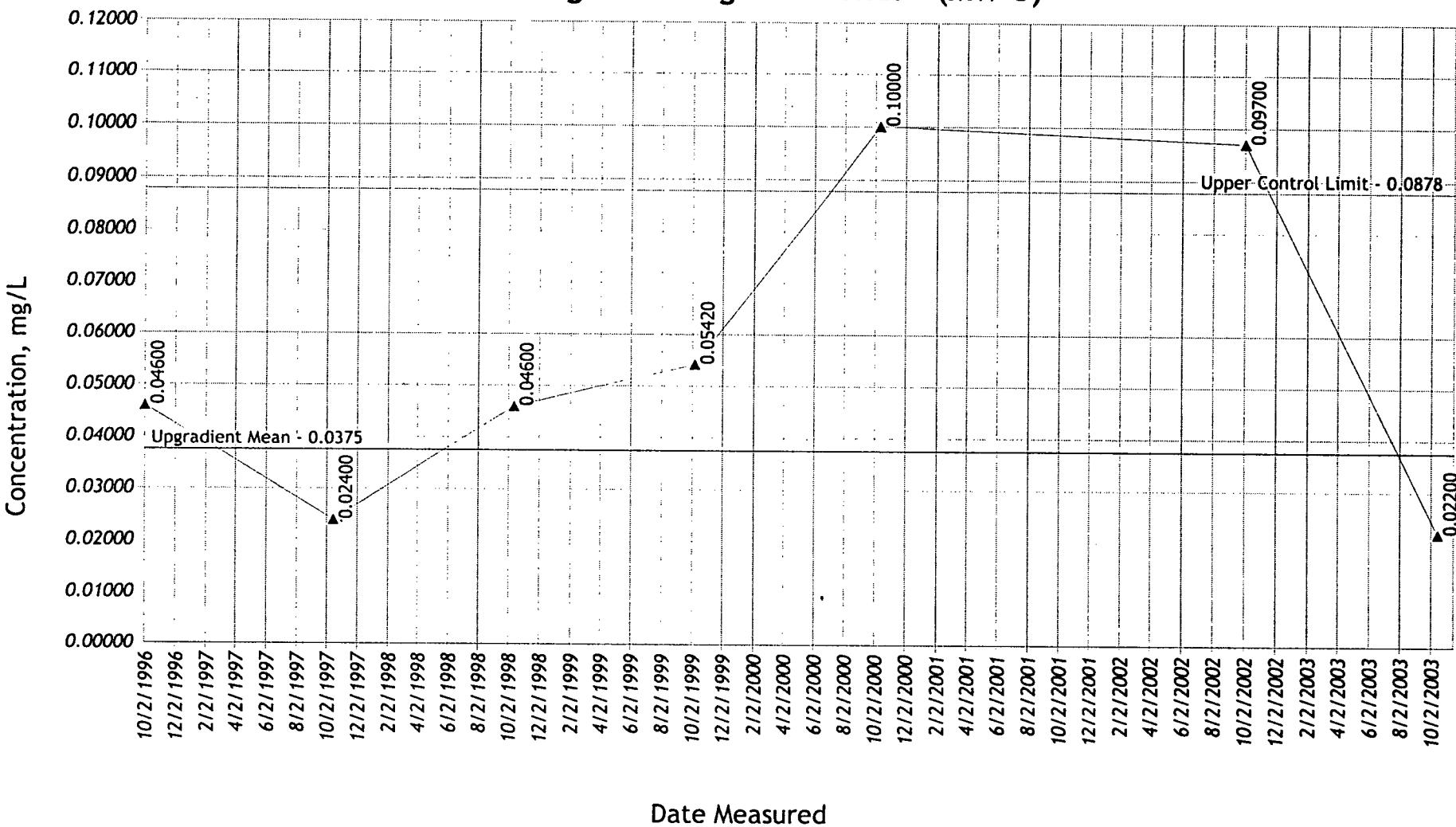


22

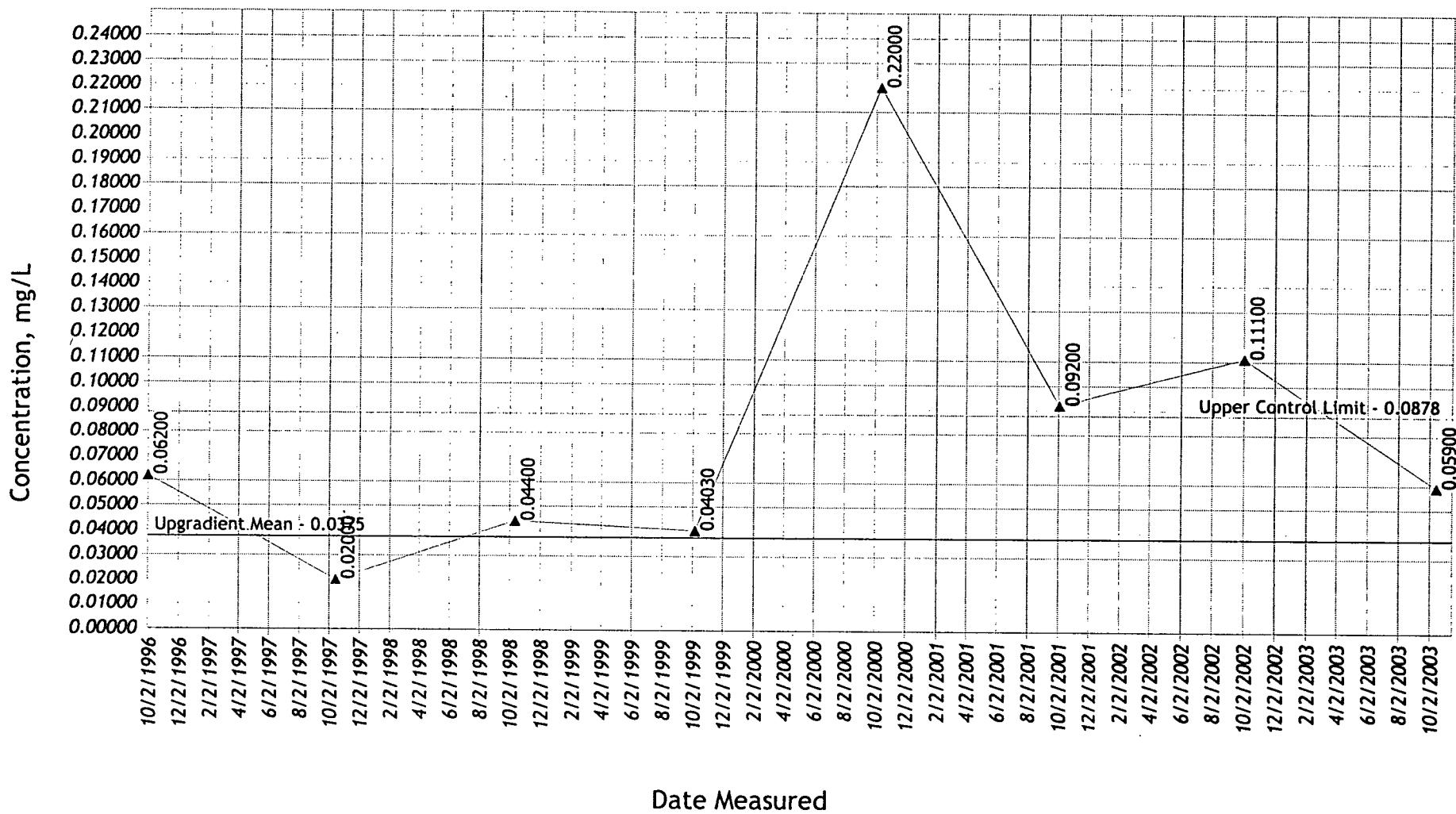
Total Organic Halogens
Carter Lake Construction and Demolition Landfill
78-SDP-02-80

03001
11/14/2003 12:34:07 PM

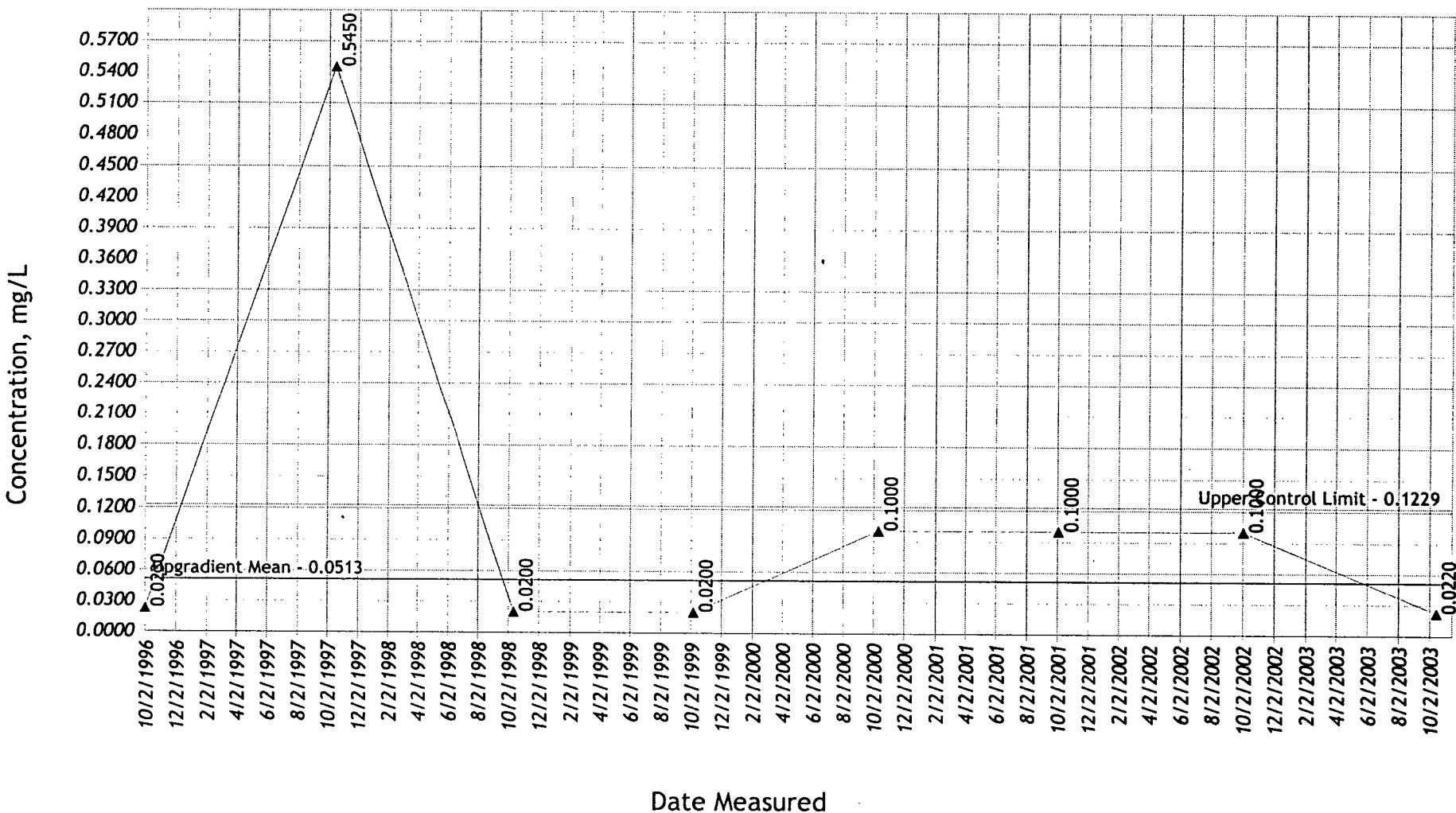
Total Organic Halogens Trends - (MW-3)



Total Organic Halogens Trends - (MW-5)



Total Phenols Trends - (MW-1)

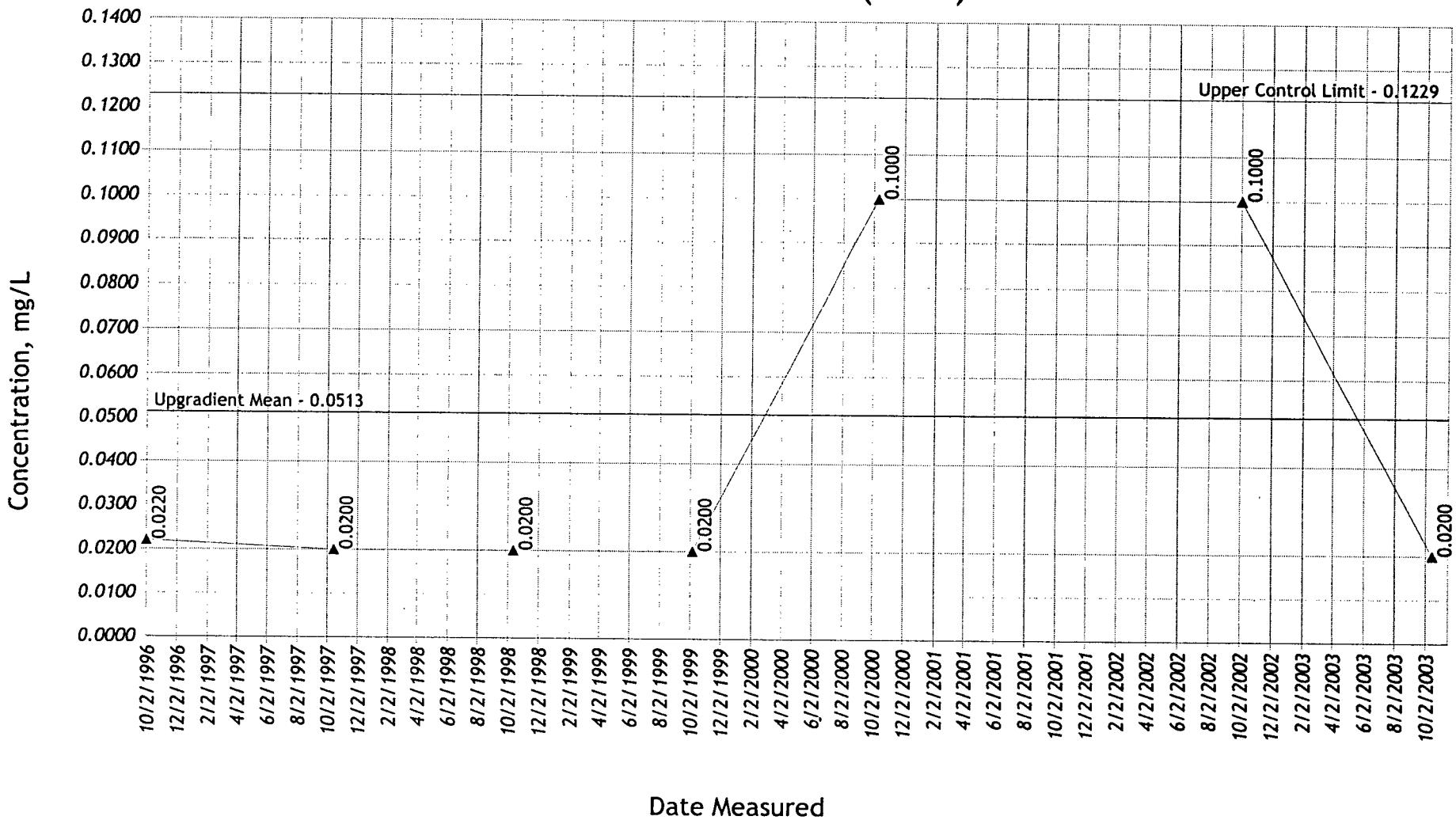


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Total Phenols
Carter Lake Construction and Demolition Landfill
78-SDP-02-80

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Total Phenols Trends - (MW-3)



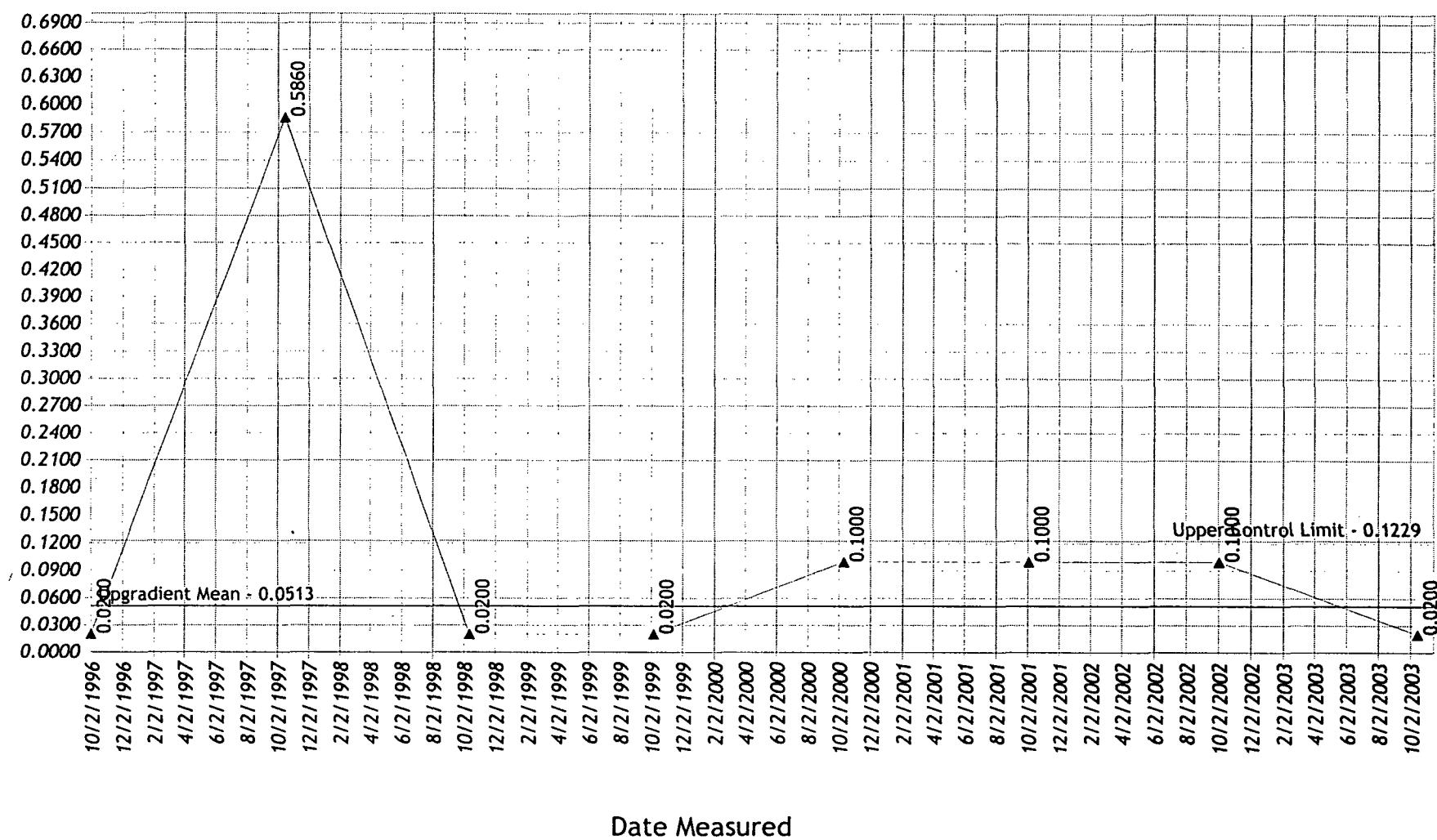
26

Total Phenols
Carter Lake Construction and Demolition Landfill
78-SDP-02-80

03001
11/14/2003 12:34:28 PM

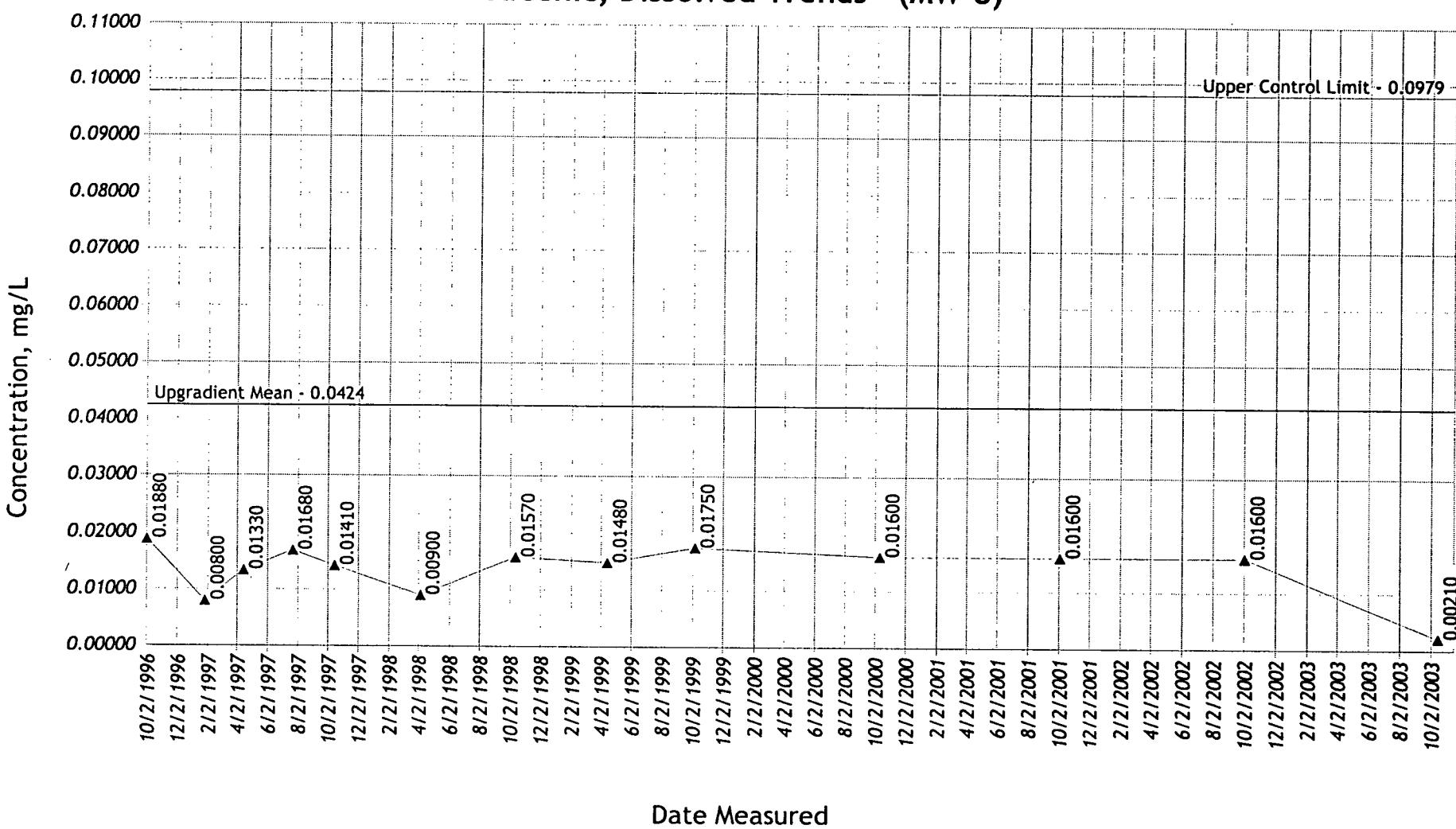
Total Phenols Trends - (MW-5)

Concentration, mg/L

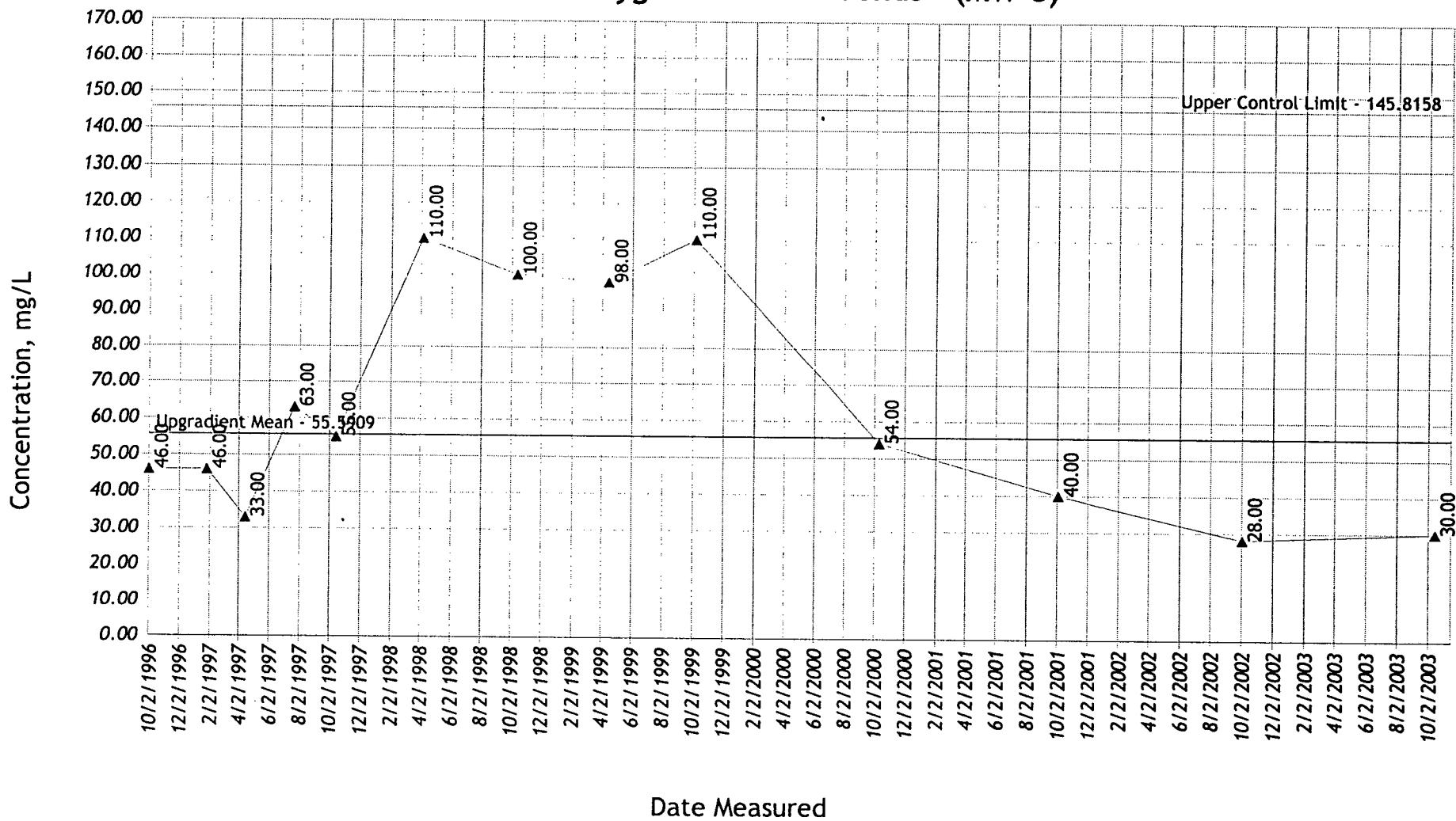


Total Phenols
Carter Lake Construction and Demolition Landfill
 78-SDP-02-80

Arsenic, Dissolved Trends - (MW-8)



Chemical Oxygen Demand Trends - (MW-8)

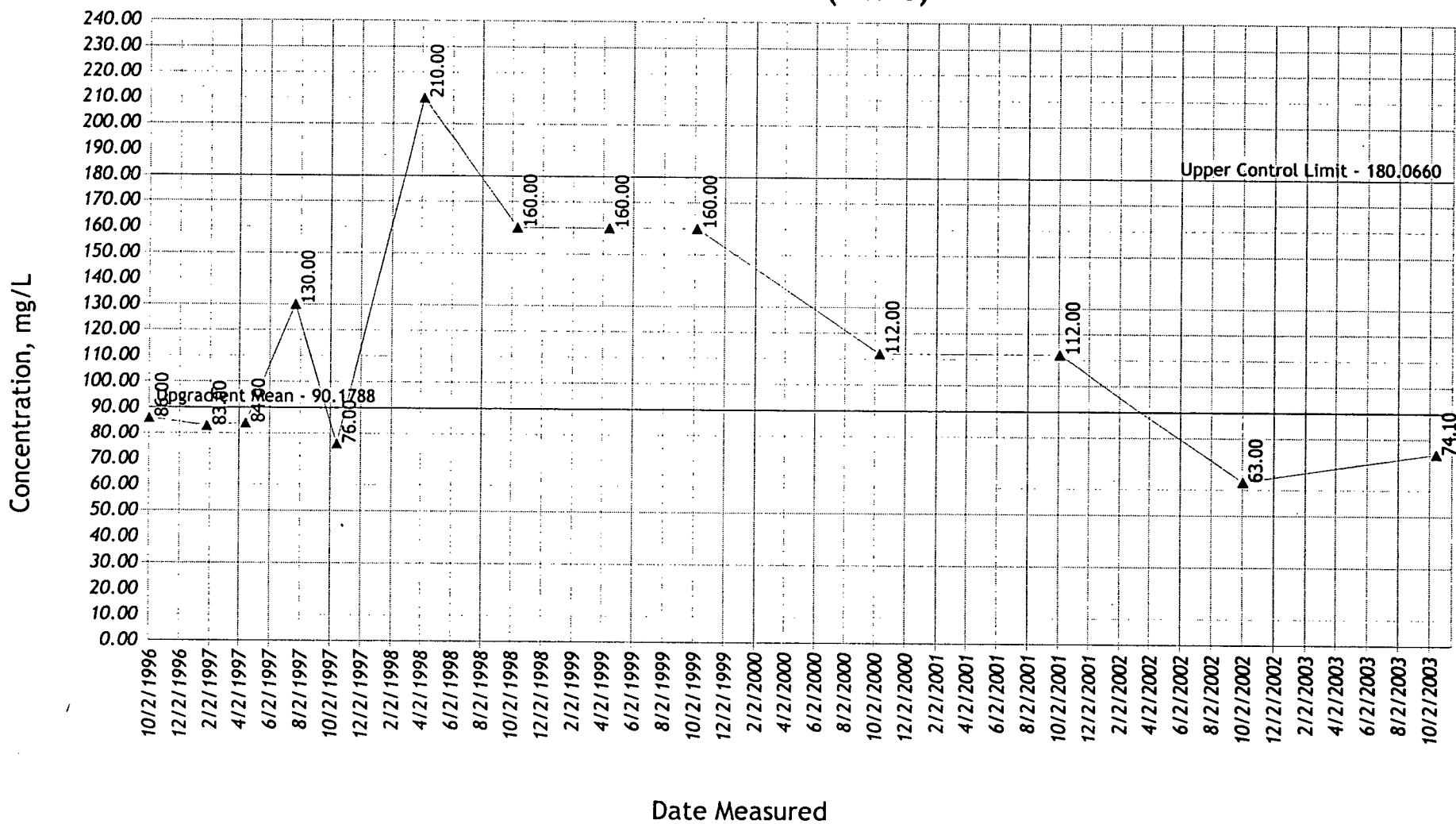


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Chemical Oxygen Demand
Carter Lake Construction and Demolition Landfill
78-SDP-02-80

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11/14/2003 12:35:01 PM

Chloride Trends - (MW-8)



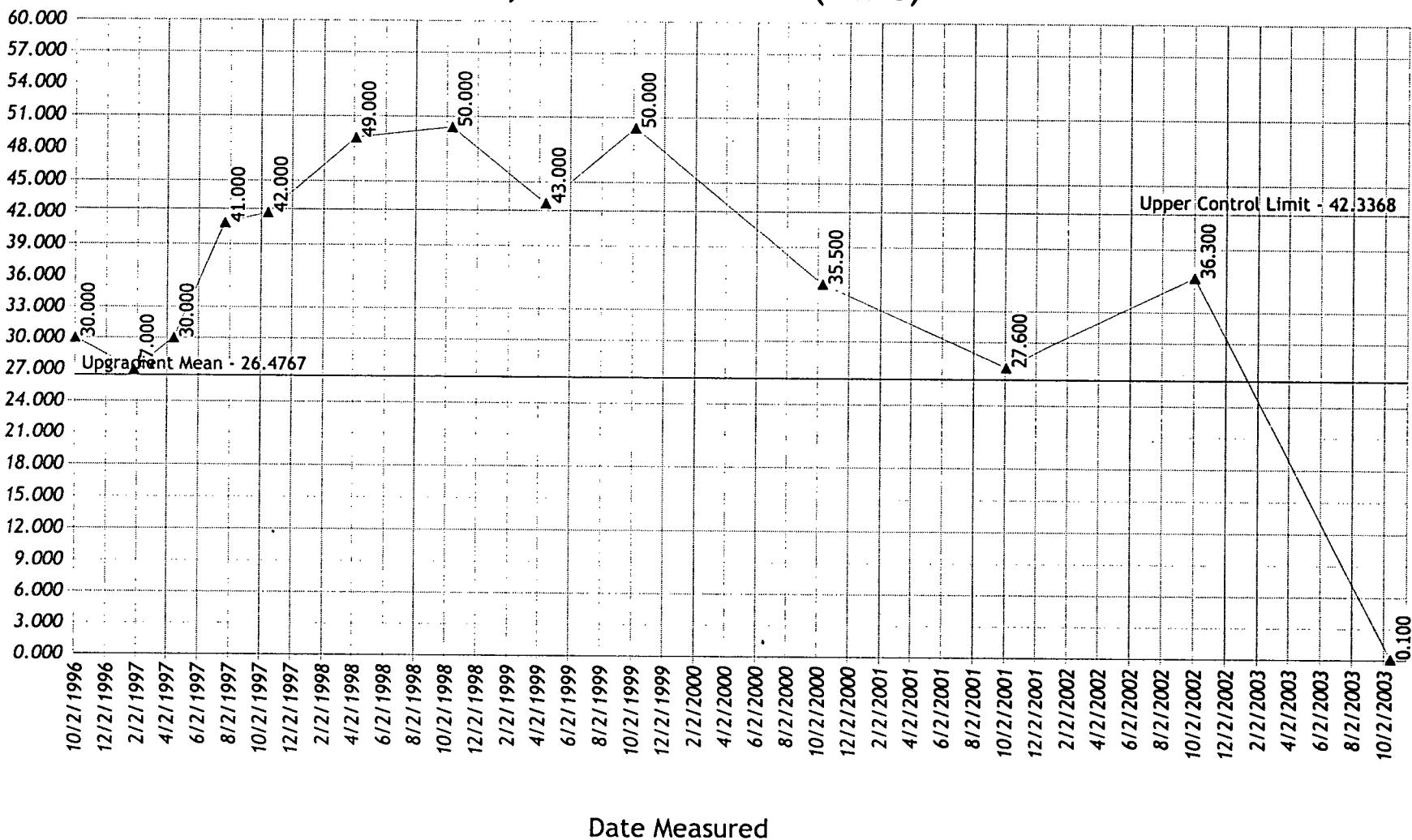
30

Chloride
Carter Lake Construction and Demolition Landfill
 78-SDP-02-80

03001
 11/14/2003 12:35:14 PM

Iron, Dissolved Trends - (MW-8)

Concentration, mg/L



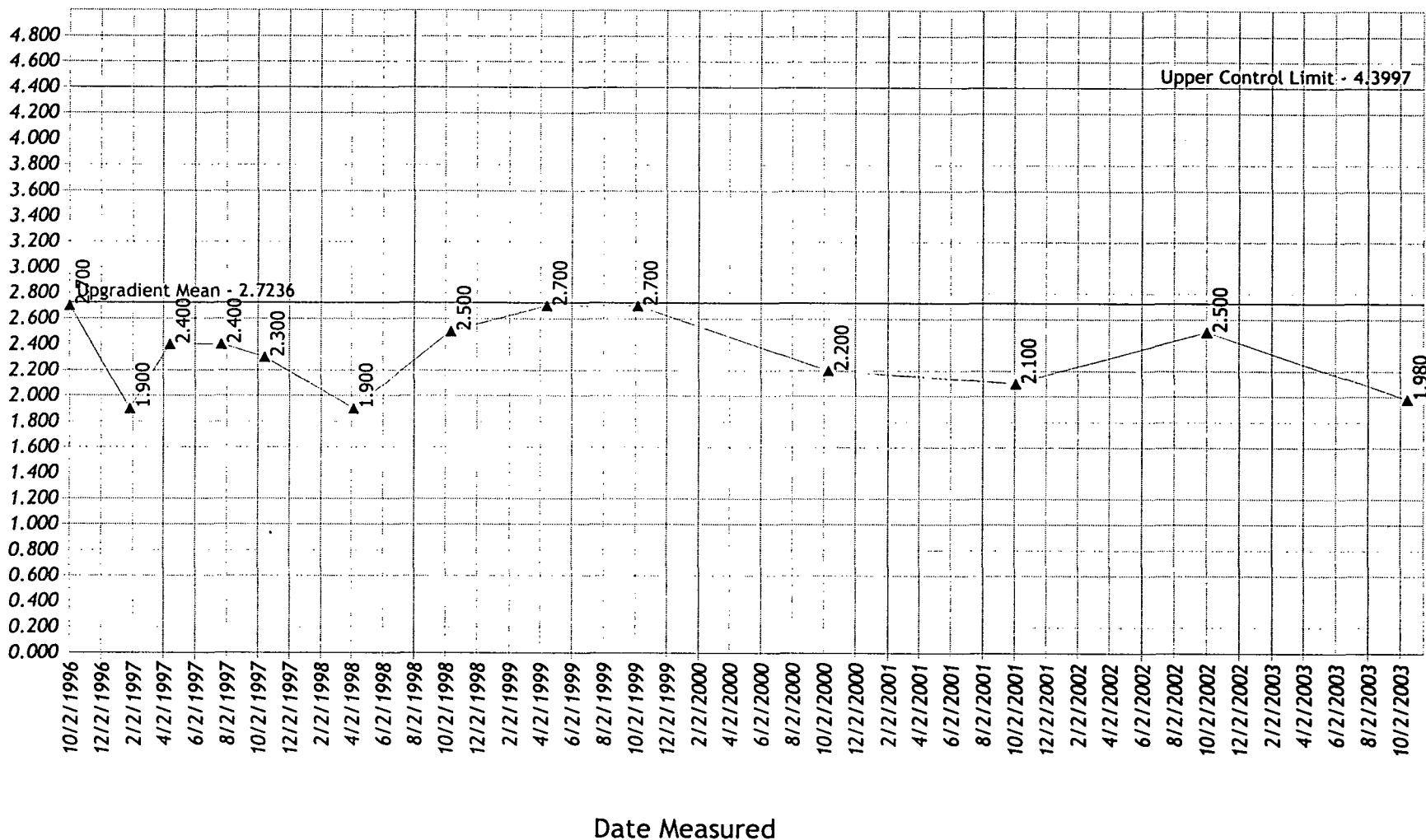
31

Iron, Dissolved
Carter Lake Construction and Demolition Landfill
78-SDP-02-80

03001
11/14/2003 12:35:25 PM

Nitrogen, Ammonia Trends - (MW-8)

Concentration, mg/L



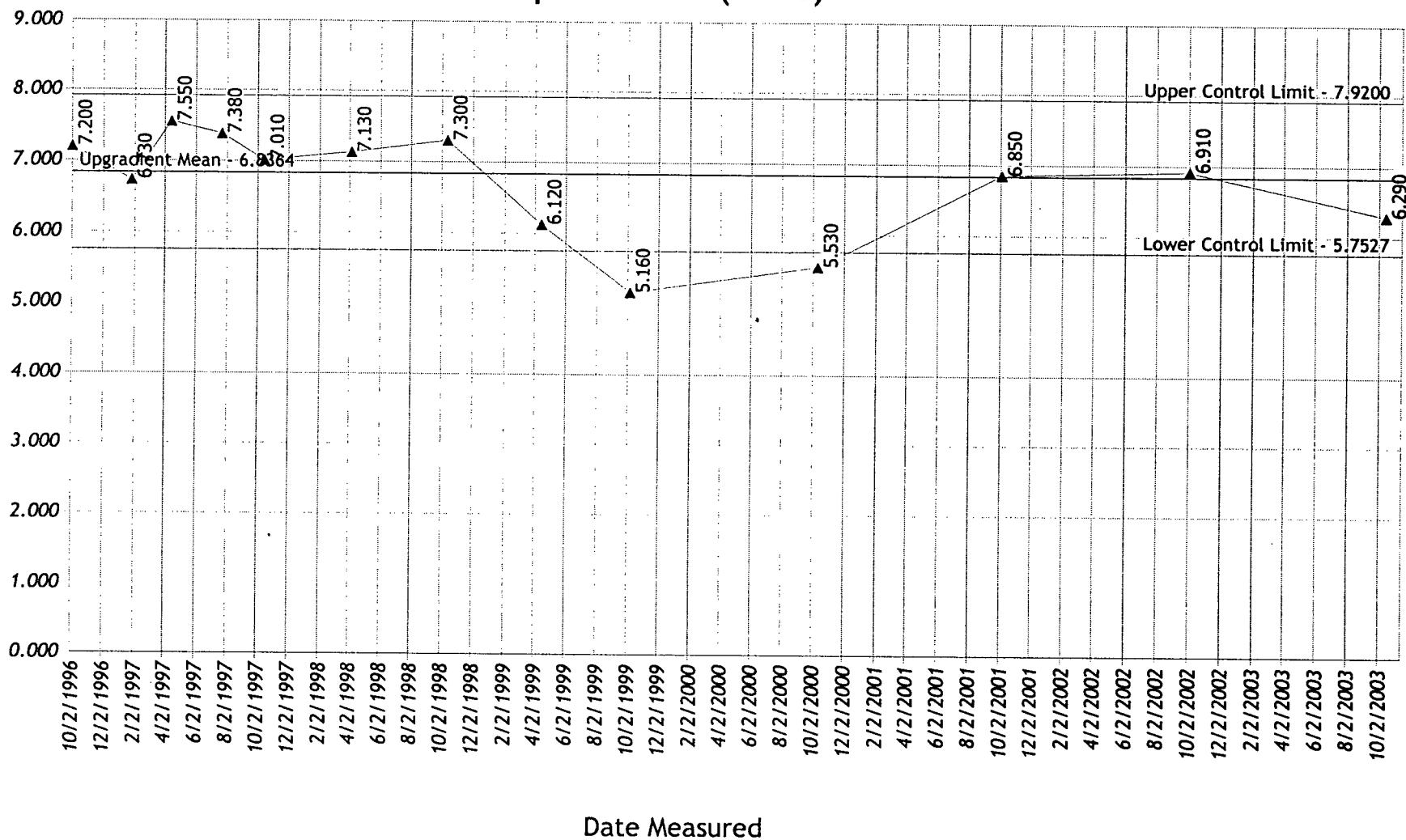
32

Nitrogen, Ammonia
Carter Lake Construction and Demolition Landfill
78-SDP-02-80

03001
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pH Trends - (MW-8)

Concentration, S.U.



33

pH

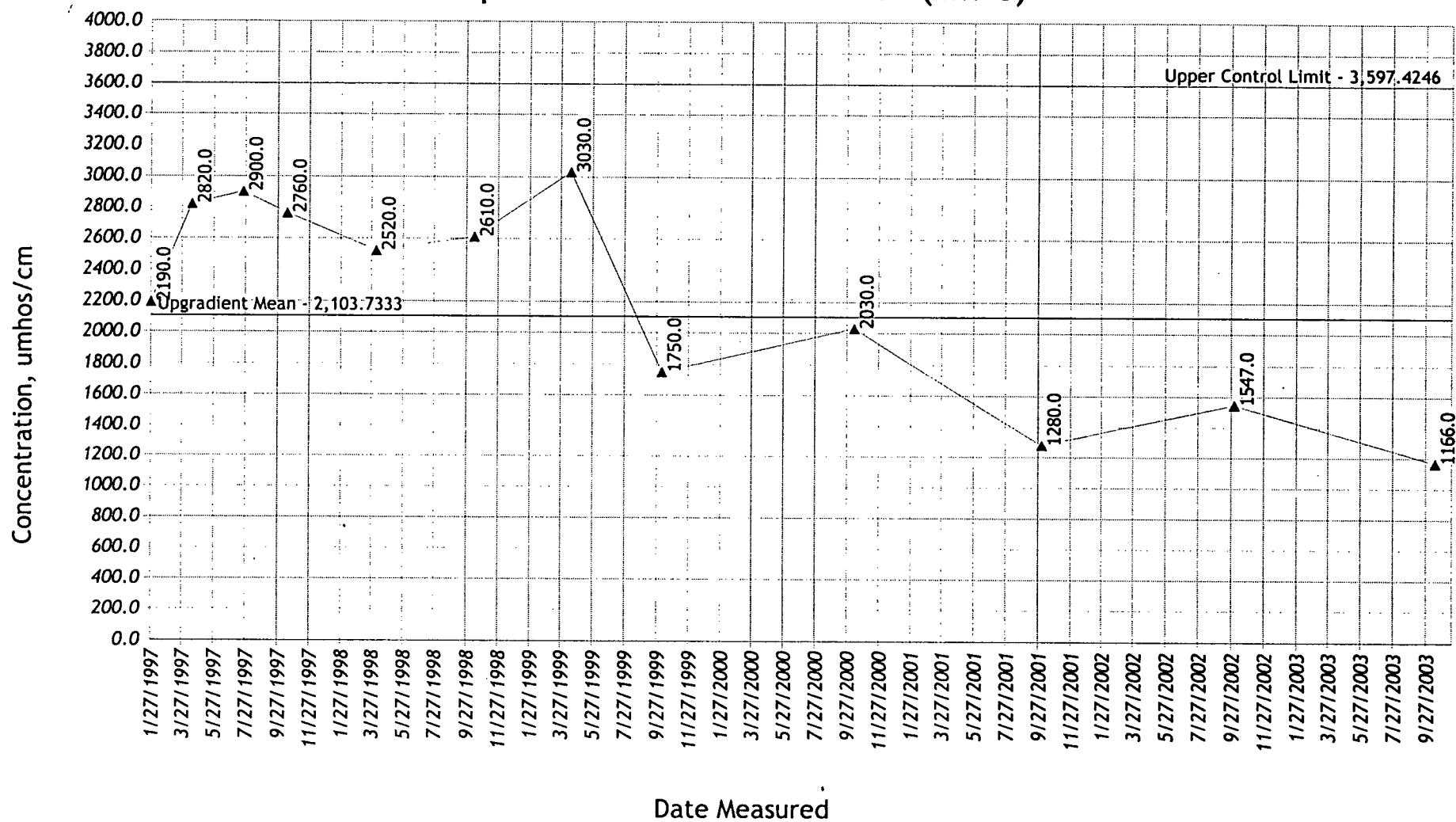
Carter Lake Construction and Demolition Landfill

78-SDP-02-80

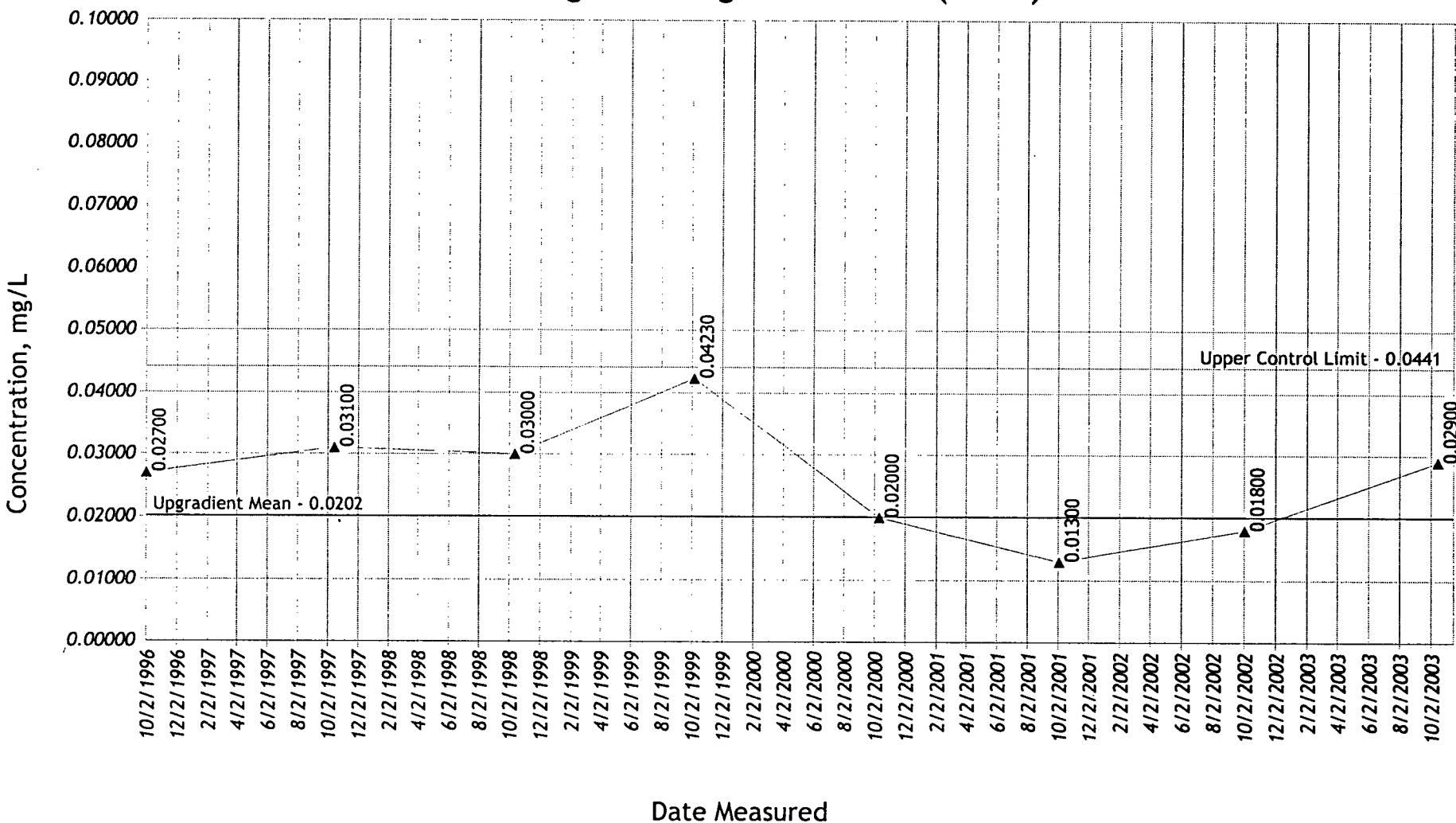
03001

11/14/2003 12:35:53 PM

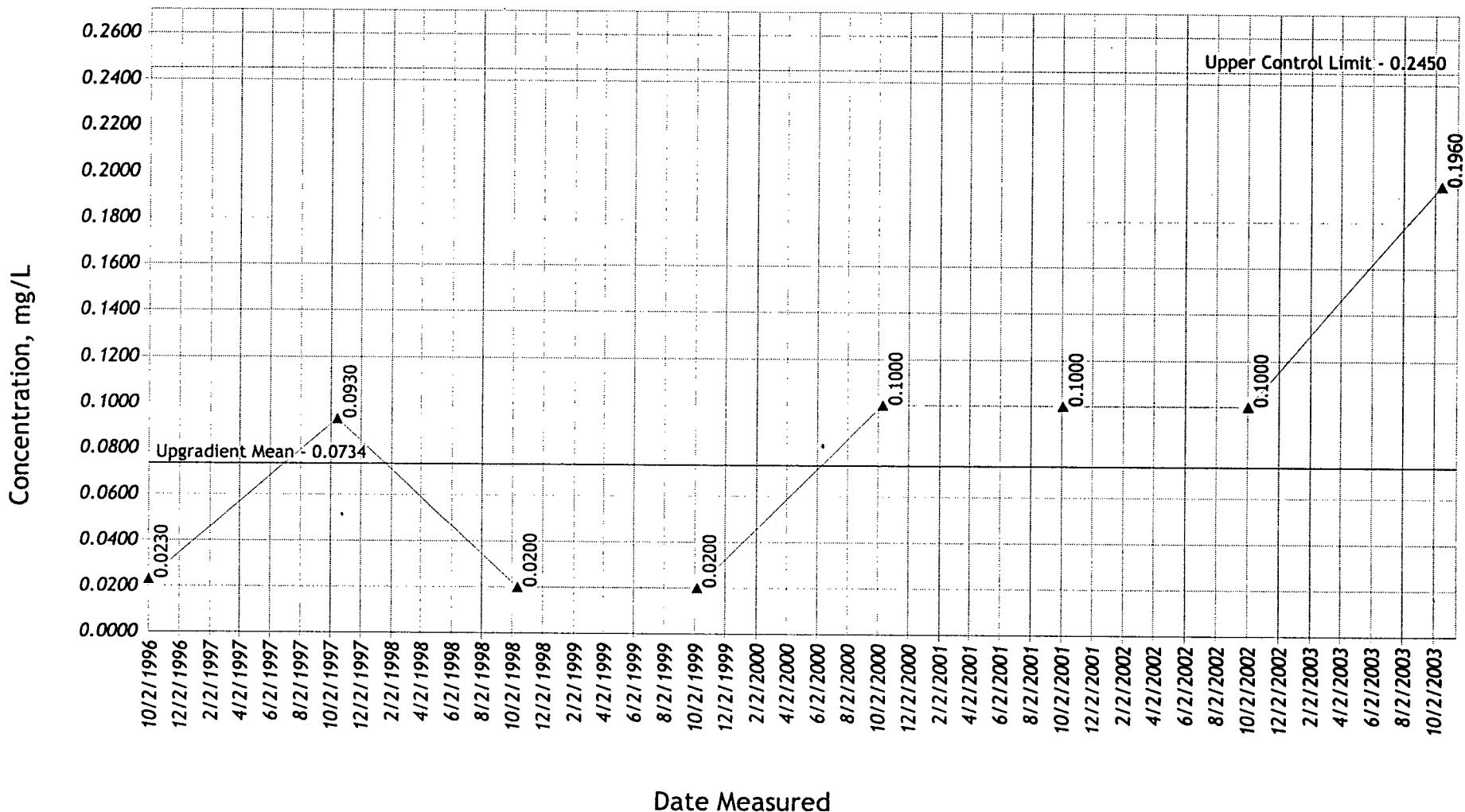
Specific Conductance Trends - (MW-8)



Total Organic Halogens Trends - (MW-8)



Total Phenols Trends - (MW-8)



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Total Phenols
Carter Lake Construction and Demolition Landfill
78-SDP-02-80

03001
11/14/2003 12:36:18 PM